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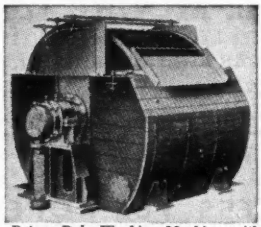

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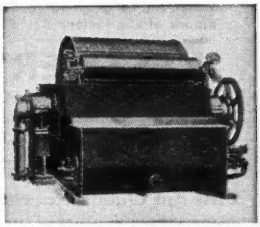

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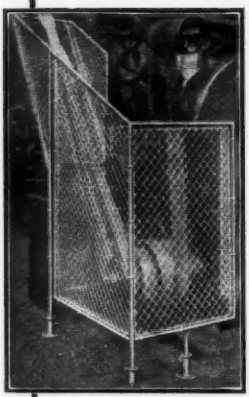

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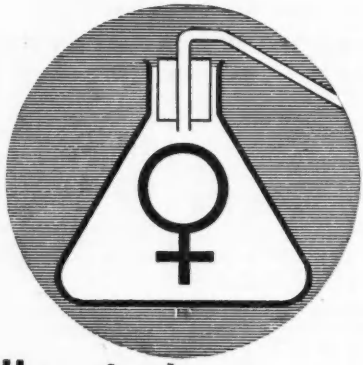

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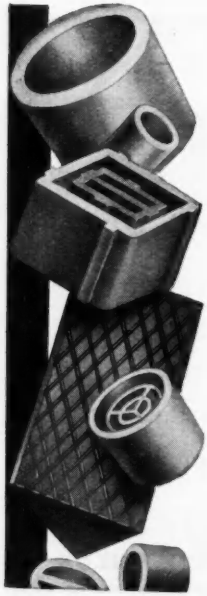

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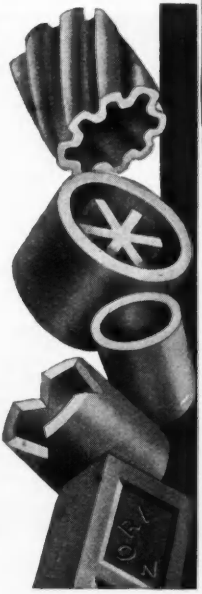

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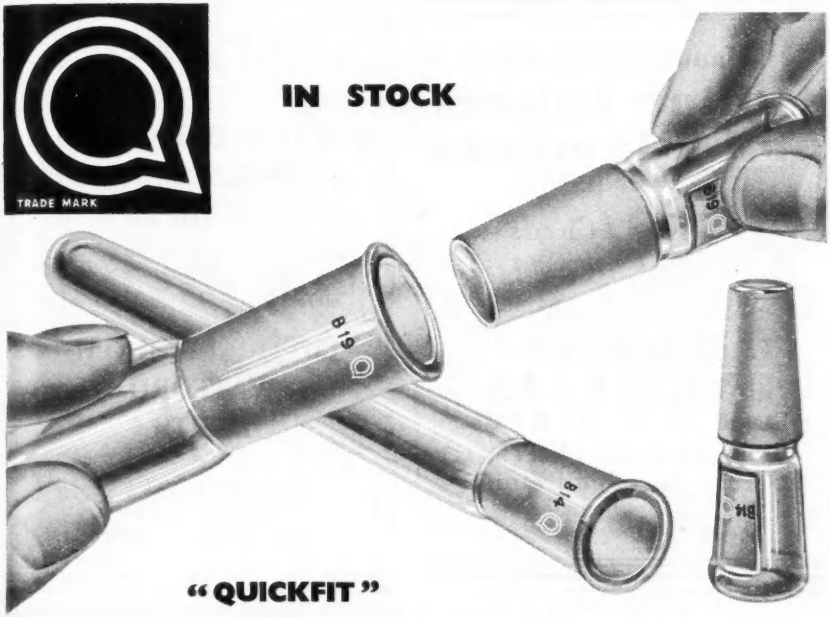

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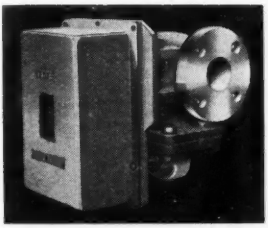

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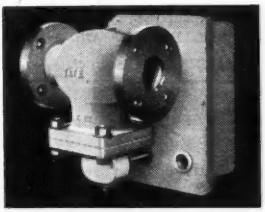

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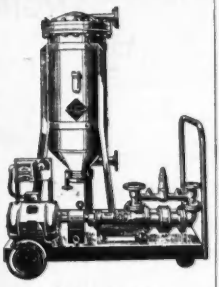

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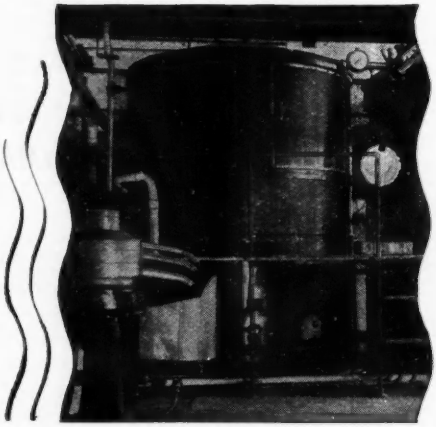

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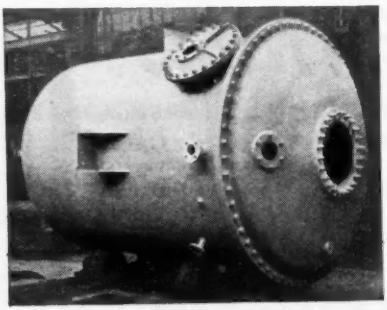

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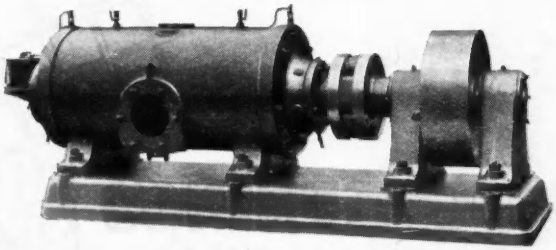

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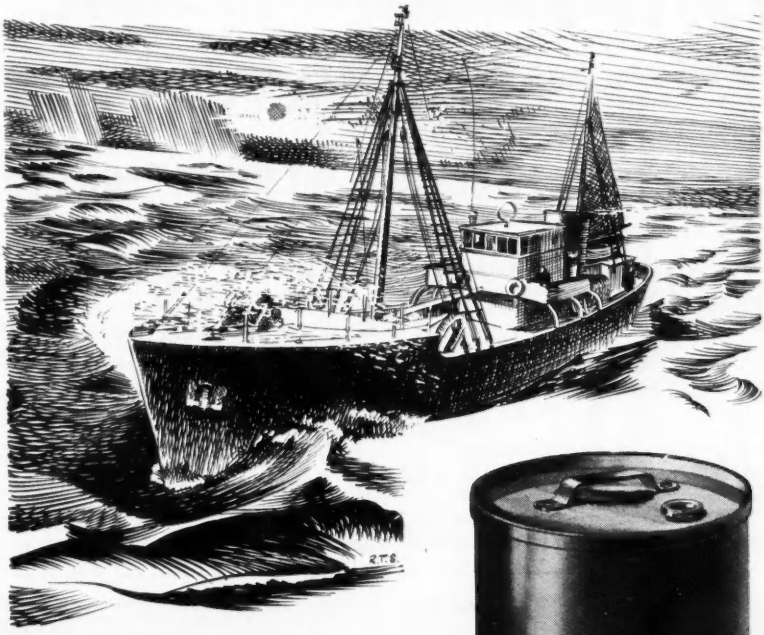

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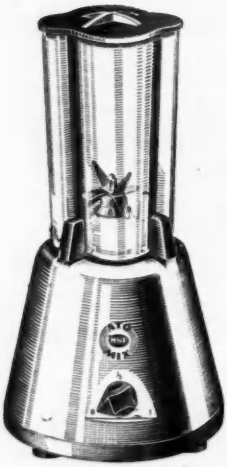

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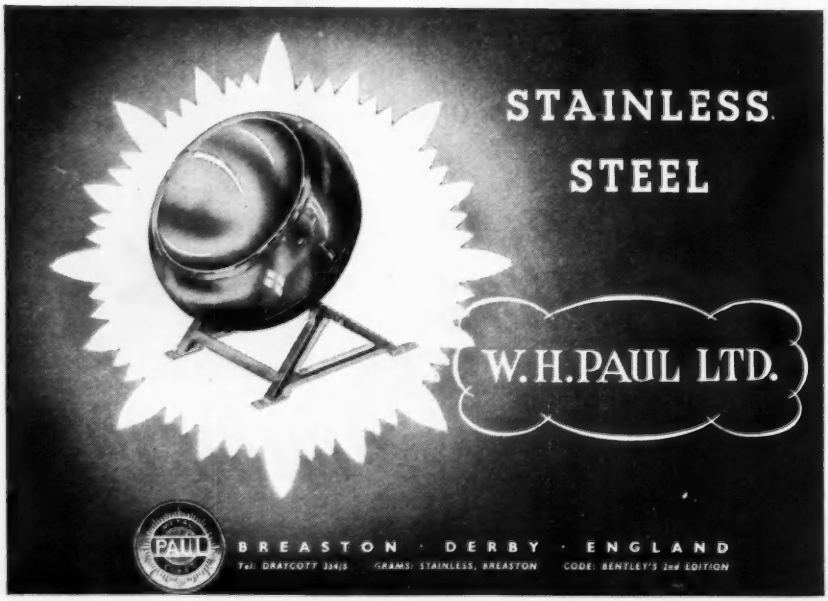

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VOL. LX
No. 1540.

15 January 1949

Annual Subscription 26s.
8d. per copy, post paid, 10d.

Freedom for Research

THE knowledge that the long and highly productive leadership by Sir Edward Appleton of the Department of Scientific and Industrial Research is nearing its end is unwelcome, even when it is recognised as being, sooner or later, inevitable. The solid practical benefits which have accrued to industry during the nine years of Sir Edward Appleton's tenure of office as secretary of the department have completely allayed the distrust which may have been felt in the early stages of this remarkable experiment in Government financed research. Much of the credit for that must be attributed to the direct and realistic approach encouraged by the secretary, and the circumstance that his own distinguished contribution to fundamental investigation ensured that the sources from which all improvements in industrial technology are derived has never been relegated to the background.

To have retained that indispensable balance and far-seeing vision, as an organisation owing direct obedience to any Government in power, is a feat which none of the Government offshoots in industry of more recent origin even begin to equal. That is a credit both to the secretary and to the Governments which have controlled the finances of the department, and for whom the fatal temptation to "direct the scientists into more productive channels" must at times have been hard to suppress. That danger has been most skilfully circumvented, but not exorcised, and the course of much official policy since 1945 towards direct participation by the Administration in industry suggests that even the independence of the DSIR may not always be regarded as indispensable.

That is approximately the situation which is threatened in Australia and is creating alarm among those qualified to judge the value of the contributions to science and industry of Australia's Council for Scientific and Industrial Research, some departments of which are now facing the likely prospect of losing their independence, if not their identity within the Commonwealth public service departments. The danger signal was seen in the Bill recently presented before the Commonwealth Parliament designed to implement the principle that research associated with national defence is intimately a Government affair. That is not generally contested, but grave dangers appear to have arisen through the virtual impossibility of of defining precisely what departments of research are essential for preserving national security and what are not. The Australian Bill has proposed that certain employees of the CSIR shall be transferred to the Commonwealth Public Service, but has been drafted in terms which could empower the Government almost to engulf the country's research organisation.

The CSIR, lead by Sir David Rivett, contemporarily president of the Society of

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Chemical Industry, has traditions of almost as long standing as the DSIR's and the aid it has rendered to the rather more limited aims of Australian industries has earned it high regard. It, too, has hitherto preserved for more than 20 years the privilege of operating freely, obedient only to the long-range needs of industries. The council derives from the same circumstances which gave rise to the DSIR—the country's dangerous dependence upon others for some scientific equipment and essential chemicals, the dangers of which were forcibly illustrated in the course of the 1914-18 war. So, as early as 1916 Australia had established an Advisory Council of Science and Industry, out of which was constructed four years later the Commonwealth Institute of Science and Industry. This was in effect the CSIR in all but the title, the adoption of which coincided with the reorganisation of the institute on an encouragingly wide basis in 1926.

The intention of the many collaborators in the young CSIR, among them Australia's principal scientists and industrialists, was clear. It was to operate without intervention from Government or public service departments, and so far that principle has been sustained with gratifying results. Its responsibilities for sustaining research for primary and secondary industries, administering grants for pure research and keeping available to all a flow of scientific and industrial information have been performed no less adequately than those of the DSIR in its even wider sphere.

All that is now endangered by a new conception, of which the Australian Bill is the reflection. It proposes, for example, that any work carried out by the CSIR may be transferred, by authority of a proclamation alone, to any State department. Transfer of research projects would involve compulsory transfer of the workers too—ostensibly on the same terms of employment.

Anyone acquainted with the spirit which animates any research department worth its salt will know that the system of block transfers and the directives inseparable from most Government departmental work are fairly certain means of setting up another sinister variant of "GPI"—general paralysis of initiative. Competent opinion in Australia is well aware of this and, accustomed as it is to incursion of authority in industrial affairs, is justifiably alarmed by the possibilities to which this Bill has given rise.

All this, it may be objected, is taking place some 13,000 miles away. The problem possibly in the immediate future may be to ensure that similar policies authorised by the plea for co-ordinating defence measures do not take root nearer home.

NOTES AND COMMENTS

Mounting Offensive

COUNTER attacks upon the Iron and Steel Bill continue to gain in number and weight as the tale of weeks lengthens since the Bill was presented. The array of evidence that has been mustered, showing that the Bill has no rational economic purpose and contains the seeds of chaos, is undeniably impressive, none more so than the Conservative Political Centre's "Inside Industry—Steel," being circulated this week. It is, however, not easy to suppress the reflection how much more effective much of this would have been had it been offered on the eve of the Bill's presentation. The powerful defence of the industry which has been offered in unequivocal terms by the federations within and outside the steel industry, by individuals and now by the Conservatives would have been no less relevant then. But, as these Notes remarked several weeks before the Steel Bill took shape, the early opportunity of presenting the situation in its true perspective was persistently neglected. The habit of taking arms only after the first hostile salvo has been discharged has many unfortunate parallels, in the dismal record of State incursions in industry, as well as in other connections. That programme is conspicuously not yet complete and it will be interesting to observe whether the next intended victim exhibits the same apparent indifference on the eve of the attack.

"Doctrinal Fallacy"

THE presentation now of the opposition case by the Conservatives is lucid, comprehensive and convincing, and would have been more forceful had not most of it been said, piecemeal, before. But in one passage it puts the situation in focus, without further reference to the familiar statistics. Thus: "it is difficult to see how an objective observer viewing the industry to-day, with its vast plan of development being put into operation, its production records, its increased output per man-year, its low prices, its immense contribution to our export drive, its good labour relations and its progressive management, could fail to agree with Mr. Churchill that there is no better foundation for steel nationalisation than 'doctrinal fallacy and partisan intrigue.'"

Monopoly Hunt

A GOOD deal of private speculation about the degree of success likely to be achieved by the eight who have been singled out to compose the Monopolies and Restrictive Practices Commission has followed the publication of their names a few days ago. (*Page* 113, *this issue.*) This body for which the Monopolies Bill (THE CHEMICAL AGE, May 1 and 5, 1948) provided to be one of the main instruments in assembling and sifting evidence of monopolistic activities (other than the Government's), has one of the most formidable assignments of any recently constituted. It will in effect be the special tool of the Board of Trade, charged with finding the facts about any monopoly complaint which the Board may see fit to hand to it. Allegations of monopoly and restrictive practices may also be levelled from other quarters in Parliament and, it may be assumed, these, too, could become subjects for the anxious scrutiny by this fact-finding commission if the Board of Trade is satisfied that a case lies. The situation evokes visions of an economic-cum-mercantile CID, whose responsibilities might daunt even that pertinacious department of Scotland Yard which specialises in financial delinquency in high places. All this necessarily depends upon what exactly are the terms of reference of the commission and in particular what powers are to be conferred on it to procure the factual evidence which alone would justify Government intervention to bring to an end monopoly control, deemed to be "not in the public interest," of any branch of our economy. A brief review of the sources of some chemicals brings to mind quite a number of monopolies and near-monopolies. Closer investigation of almost every one of such instances will reveal that our equivalent of what in the U.S.A. is dubbed a trust is generally providing a service which no other undertaking would willingly render at the same price. The commission will have occasion to give thanks if its task falls short of recommending how monopolies are to be circumvented. That presumably will be the duty of Parliament.

in which there are some who would not be reluctant in trying, as a corrollary, to apply the Iron and Steel Bill formula in new and even more hazardous directions.

Combined Heat and Power

THE paradox of the fuel and power situation in this country to-day is that whereas the production and distribution of fuel are being planned on a national scale, consumption is largely unco-ordinated. The Institute of Fuel, directing attention afresh to the anomaly, observes that as a result a surplus of energy in one industrial undertaking is often wasted when it might be transferred to a neighbouring works at which there is a temporary deficiency. By inter-linkages it is considered that many millions of tons of coal a year would be saved, representing a substantial contribution to national recovery. The institute is not contenting itself with stating the problem and has taken the initiative in promoting two conferences on the problem of combined heat and power supplies at which the intention is to co-ordinate the known data and provide a basis for investigation in one or more geographical areas. The first all-day conference will be held at the Institution of Mechanical Engineers on January 25, when papers will be presented, two by Mr. J. Edward and Messrs. J. B. M. Mason and L. Clegg, showing how the overall efficiency of generation and utilisation of steam in an industrial plant can be improved by the construction and use of a heat balance. The third, by Dr. E. G. Ritchie, will examine the effects of fluctuations in the demand for steam upon the fuel consumption of the plant.

Too Few Pharmacists

THE tendency to encourage college students to concentrate on industrial and manufacturing chemistry, rather than on retail pharmacy, is worrying some Scottish managements. That policy, it is felt, is liable to create an acute shortage of qualified pharmacists in Scotland between 1949 and 1952. The larger firms in commercial pharmacy, foreseeing greatly increased activity stimulated by the National Health Service, enlarged their dispensaries and recruited staff. But they agree that, for many individual pharmacists, the problem of finding trained apprentices is ever-present and that there is no apparent immediate prospect of improvement. There is an overall shortage of junior workers, and intelligent youths and girls who would normally have looked to pharmacy as one of the jobs offering suitable returns for skill and diligence find many openings elsewhere. Considered even more serious, however, is the loss of pharmacy workers or potential pharmacists to the other branches of the industry. This process has been intensified in recent months and is having the support of some educational centres. It is emphasised once more that commercial pharmacy demands a full time training, concentrated on commercial pharmacy practice and that it is not possible to produce properly trained retail pharmacists by part-time training, as has been suggested. At the moment commercial pharmacy, in the matter of academic training, is being obliged to play second fiddle to manufacturing and industrial chemistry. Some relief has been obtained under the scheme by which ex-Servicemen are being given one year's intensive training, but the majority of managements believe that help from other sources will be practically non-existent during the next four years.

Trade Exhibitions

AN Exhibitions Advisory Committee of the Board of Trade has been set up under the chairmanship of Sir Guy Locock, a vice-president of the Federation of British Industries and a member of the Ramsden Committee, on whose report, issued towards the end of 1945, the Government's policy on trade exhibition questions has been based since the war. Among the members of the committee—the composition of which is not yet complete—are :—Mr. Allen L. Stock (The Morgan Crucible Co., Ltd.), Mr. W. L. Chance (Chance Bros., Ltd.), Mr. J. Davidson Pratt (director, the Association of British Chemical Manufacturers). It has been found necessary to draw up the 1949 programme of official participation in trade fairs overseas without waiting for the views of the new committee. Negotiations are at present in progress for suitable sites, and it appears likely that official information stands will be installed at Poznan (April 23-May 10), Toronto (May 31-June 10), Stockholm (August 24-September 10), and Utrecht September 6-15).

Effects of the Steel Bill

Engineering Industries' Opposition

A LETTER to each of the 3500 members of the Engineering Industries' Association has been written by Lord Davidson, the president, giving the reasons why the association has publicly stated its opposition to the Iron and Steel Bill.

Lord Davidson says that the object of the association is to co-operate with the Government, whatever party was in power. It was obliged to protest against decisions which could only hamper the industry.

The effects of the Bill would be threefold. First, it would disrupt the steel industry splitting it into nationalised, licensed, and "free" sections.

Second, a rigid central control (the Iron and Steel Corporation) would be substituted for the present system. Under the latter, individual firms maintained their independence and competed in achieving efficiency and studying the needs of consumers, while the Government controlled policy and prices only on broad lines.

Finally, it would bring Government-owned units in the engineering industries into direct competition with privately owned undertakings, which could lead to prejudicing the fair allocation of raw materials and licences.

FEWER FATAL ACCIDENTS

THE number of fatal industrial accidents and cases of deaths from industrial diseases in November last year are reported in *The Ministry of Labour Gazette* (Vol. LVI. No. 12, December, 1948).

Deaths from accidents in the course of employment in the United Kingdom showed a considerable decrease, 126 in November, compared with 157 (revised figure) in October, 1948, and 141 in November the previous year. Metal extracting and refining and metal conversion accounted for 16 fatal accidents and other metal trades two. There was only one fatal accident in chemicals, oils, soaps, etc.

Cases reported under the Factories Act, 1937, or the Lead Paint (protection against Poisoning) Act, 1926, in November totalled 34. The cases are detailed as follows: Lead poisoning five. Other poisoning: mercurial, one; carbon bisulphide, one; aniline, one. Compressed air illness, two. Anthrax, two. Epitheliomatous ulceration (skin cancer): pitch, four; tar, six; oil, one. Chrome ulceration: manufacture of bichromates, two; chromium plating, 9. There were no deaths.

Monopolies Commission

Total Salaries £12,500 Annually

THE Board of Trade has announced the appointment of the following to be members of the Monopolies and Restrictive Practices Commission: Chairman: Sir Archibald Carter, K.C.B., K.C.I.E.; members: Mr. C. N. Gallie, Mr. Frederick Grant, K.C., M.C., Mrs. Joan Robinson, Sir Harold Saunders, Mr. Gordon Stott, Mr. Josiah Wedgwood and Mr. R. E. Yeabsley, C.B.E.

The commission is set up under the Monopolies and Restrictive Practices (Inquiry and Control) Act, 1948. It will not initiate inquiries but will investigate matters referred to it by the Board of Trade. Its address for the time being will be the Assistant Secretary, I.M.1 Division, Board of Trade, Millbank, S.W.1.

The Board of Trade notification shows that the chairman, who was Permanent Under Secretary for State for India in 1947 and was formerly chairman of the Board of Customs and Excise, has been appointed for five years at a salary of £5000 a year. Sir Harold Saunders, Comptroller-General of the Patent Office until the end of this month, was a member of the Swan committee on the Patents and Designs Act. He becomes a full-time member of the commission for five years at an annual salary of £3000. Mr. R. E. Yeabsley will give "a substantial part of his time to the commission" and will receive £2000 a year.

The others composing the commission are part-time members, appointed for periods of three to five years (£500 a year each).

REVIEW OF EMPLOYMENT

CHANGES in the level of employment between mid-1939, mid-1945, mid-1947, and October, 1948, in various industries are published in the December issue of *The Ministry of Labour Gazette*.

Chemicals, paints, oils, etc., under Group I (Metal and Chemical Industries) show a steady satisfactory increase all round over the period covered, though there was a natural decline in explosives at the end of the war. The total number employed in chemicals and allied trades in October, 1948, was 363.6 thousand. The distribution of labour was as follows:—

Industry	(Thousands) Mid-1939	Mid-1945	Mid-1947	Oct. 1948
Coke ovens and by-product works ...	12.4	12.7	13.7	14.5
Chemicals	124.8	157.5	187.9	196.1
Explosives	37.1	168.7	34.6	33.7
Paint, varnish, etc. ...	26.9	23.4	30.0	32.0
Oil, glue, soap, ink, etc.	83.2	75.8	81.6	87.3
Total chemicals, etc....	284.4	438.1	347.8	363.6

Parliamentary Science Group

Sir John Anderson Remains President

A NUMBER of new proposals concerning the constitution of the committee and the election of officers will be brought forward at the annual meeting of the Parliamentary and Scientific Committee to be held at the Savoy Hotel at 11.30 a.m. on January 27.

It is proposed that the number of vice-presidents should be increased from seven to eight, the two most senior to retire annually. The general committee, however, are to retain their right to waive this retirement should it be justified by circumstances.

The appointment is also proposed of an additional deputy-chairman, making a total of two, one to be a supporter of the Government and the other a member of the Opposition.

Upon the election of officers, the general committee is to exercise its right to waive the three-year rule, and the president, Sir John Anderson, and chairman Mr. M. P. Price, will remain in office for another year.

Nominations have been sought to fill the vacancies caused by the retirement (under the three-year rule), of Prof. A. V. Hill, Sir Wavell Wakefield, M.P., Mr. J. G. Bennett, and Mr. Raymond Blackburn, M.P., and to provide an additional chairman.

Subject to other decisions, there will be an election to fill the vacancies of vice-president (non-Parliamentarian); vice-chairman (non-Parliamentarian); two deputy chairmen (members of Parliament—one Government and one Opposition supporter); hon. treasurer (non-Parliamentarian); and one joint honorary secretary (member of Parliament, Government supporter).

EXTRACTION METALLURGY

THE councils of the Institution of Mining and Metallurgy and the Institute of Metals express the hope that the generous offer made by Capper Pass & Son, Ltd., in 1947, to award £200 for a period of seven years to the authors of papers on non-ferrous extraction metallurgy and on relative processes and plants, will stimulate the writing of many such papers.

Those on extraction metallurgy should preferably be submitted to the Institution of Mining and Metallurgy, Salisbury House, London Wall, London, E.C.2, and those on processes and plant used in the fabrication of non-ferrous metals to the Institute of Metals, 4 Grosvenor Gardens, London, S.W.1. Both societies are prepared to accept papers of suitable quality from non-members.

Pulp Industry

Scottish Production Projected

A PROJECT for the development of the pulp industry in the north of Scotland this year is being sponsored by the Mugiemoss paper mills, subject to the necessary authority being given by the Government to import machinery from the U.S.A. This is the first such project promoted in Scotland since the large-scale introduction of re-afforestation. The plant would use wood waste and thinnings from Scottish forests and would provide wood pulp for the paper industry in the North-East.

The large scale development of new forests throughout Scotland promises that pulping plants will be located, ultimately, at all the major timber growing centres, with ability to provide Great Britain with a valuable additional supply of pulp, replacing to some extent the materials at present imported. The Scottish paper industry is also continuing research work into the potentialities of straw as a paper-making material. This was used very extensively in place of esparto during the war years, but rather less use has been made since esparto became again generally available.

SAFEGUARDING THE THAMES

PRECAUTIONS taken to ensure the safety of the water of the river Thames from the discharge of radio-active effluent from the atomic energy research establishment at Harwell were referred to by Sir Jocelyn Bray, chairman, in his annual statement to the Thames Conservancy Board.

Radio-active effluent, he said, was first discharged into the Thames on January 27 last year, and had continued intermittently. Definite assurances had been received that every care was being taken that the radio-active effluent did not exceed the tolerance figures laid down as safe by the precaution sub-committee of the British Medical Research Council. Effluent was checked at three stages by the Harwell staff before discharge, and further checks were made by others, including the analyst of the conservators.

The report also dealt with the concern of the conservators over arrangements for the sewerage and waste water surface disposal of the new towns at Crawley and Bracknell. The effect of the discharge of condenser water into the Thames from the new electricity station at Kingston was being closely watched.

More Soap Available.—The Ministry of Food has announced that the personal soap ration will be increased from six to seven rations per eight weeks from January 30.

CHEMICALS FROM WOOL GREASE

Great Possibilities Recalled at London Exhibition

THE exhibition "Science and Wool, 1949," now in progress at the International Wool Secretariat, Dorland House, London, effectively represents the great variety of uses and adaptations of wool and its derivatives. It will later be sent on tour of the principal wool centres of Western Europe.

One of the less known aspects of the wool industry is the development of new chemicals based on wool grease.

Effluent Recovery

Raw wool contains from 6—50 per cent of wool grease and its removal during scouring gives rise to factory effluents which, in many countries, must, by law, be freed from grease before discharge to sewers or rivers. This crude wool grease is being refined to give substances like lanoline or compounded into paints, rust preventatives, etc.

In Bradford, Yorkshire, much wool grease is recovered from sewage at a central works, but the raw material obtained in this way is very dark in colour. Nevertheless, from it can be produced drying oils suitable for paint manufacture, washable water paints, railway wagon axle grease, etc.

Direct separation of the grease from wool scouring liquors either by acid cracking (separation of the grease by the addition of sulphuric acid) or by centrifuging, gives a lighter and purer product. From these purer grades of wool grease are manufactured many kinds of cosmetics.

The remarkable transformation from the crude black grease is demonstrated in a well laid-out display showing jars of refined grease, axle grease, samples of oil and water paints, bottles of rust preventative and ending with an attractive box of cosmetics.

Another section of the exhibition deals with the chemistry of lanoline, which consists of a complex mixture of esters. This is formed by a combination of the alcohols cholesterol, β-cholesterol, agnosterol and lanosterol, and some 30 different acids.

The latter so far have remained a challenge to the organic chemist, most of the commercial development having been concerned with the cholesterol constituent which forms 15-20 per cent of the lanoline. Diagrams illustrating the structural formula of the cholesterol are shown and there are samples of the various hormones, testerone, progesterone, etc., and Vitamin D produced from it.

Anti-Lubricant

The use of colloidal silica (Syton) recently made available to the woollen industry by Monsanto Chemicals, Ltd., is the subject of another section. Syton consists of a stable dispersion of sub microscopic particles of silica in water. The particles are about 1/400,000 centimetre in diameter and non-crystalline in appearance. Relatively small amounts of Syton placed on the wool fibres act as an "anti-lubricant," increasing the drag between fibres and, it is claimed, causing them to slip past one another at constant speed.

The use of alginate rayon in the manufacture of woollen goods, such as socks is also illustrated by diagrams and specimens.

German Production of Hydrocarbons from Acetylene

ALEXANDER WACKER A.G., at Burghausen, and the I.G. Farben plant at Rheinfelden, two of the more successful German plants now operating, are described in detail in a U.S. report on the German production of chlorinated hydrocarbons from acetylene. This covers operations and equipment not described in previous reports on this subject, and has just been released by the U.S. Office of Technical Services.

A comprehensive review, outlining significant German activities in the field, the report deals with the following more important and better known chlorinated hydrocarbons: tetrachlorethane, trichlorethane, and pentachlorethane, perchlorethylene, hexachloroethane, cis- and trans-dichlorethylene and vinylchloride. Flow sheets, schematic drawings and, in some cases, production costs for most of the chlorinated compounds are provided and processes are described giving actual quantities of materials used, rather than simple summaries of operations.

Copies of the report, No. PB-75813, "Chlorinated Hydrocarbons from Acetylene," 63 pages including charts and tables, may be purchased for $2.00 each from the Office of Technical Services, U.S. Department of Commerce, Washington 25, D.C.

Chemicals Expansion Under OEEC

Estimated Production and Requirements

THE interim report issued by the Organisation for European Economic Co-operation gives a picture of plans for maintaining the economies of the 19 participating countries until 1952-3 when Marshall Aid is due to end.

Interesting chemical figures are quoted, both for production already attained, and for development schemes. Thus, nitrogenous fertilisers in 1952-3 are intended to reach the figure of 239 against 177 in 1949-50, 149 in 1948-9 and 113 in 1947 (1935-38 = 100). Potash will stand at 176 in 1952-3 against 136 in 1949-50, 123 in 1948-9 and 96 in 1947. Soluble phosphates will be 196 in 1952-3 against 174 in 1949-50, 136 in 1948-9 and 101 in 1947.

General Expansion

It will be seen that the plans forsee a considerable increase in production, approximately 30 per cent above pre-war level.

Figures for production in other basic products are given as follows: sulphuric acid: 142 in 1952-3 against 115 in 1949-50, 105 in 1948-9 and 90 in 1947. Sulphur and pyrites: 106 in 1952-3 against 90 in 1949-50, 83 in 1948-9 and 72 in 1947.

Expansion in potash production is slower than that of other fertilisers, being a mining industry and, therefore, fundamentally different from the manufacture of nitrogenous fertilisers and soluble phosphates. The expected increase in production of potash is comparable to that of other extractive industries. Even in 1952-3, however, it will be necessary for the 19 nations to import potash.

The report also says that it may be desirable to make an extra effort to increase production, although supplies do exist in non-dollar areas, and demand will increase more slowly than for nitrogenous fertilisers and phosphates. Present production programmes for nitrogenous fertilisers seem to be adequate for demand expected in 1952-3.

Plant Shortage

Continued growth of demand for sulphuric acid has outrun supply, and the latter is at present impeded by the shortage of plant. As reconstruction and erection of new plants proceed, the industry is likely to be hindered to an increasing extent by difficulties in supply of pyrites. This shortage will necessitate the use of more sulphur as a starting material than was employed pre-war.

Unfortunately, states the report, production of sulphur, particularly in Italy, will increase very slowly, so that imports of American sulphur valued at $26 million will be required in 1952-3. It therefore appears necessary to speed up production of pyrites and sulphur and to seek new methods of manufacture of sulphuric acid.

Other possible action recommended is greater economy in the use of this material, its replacement by nitric acid in the manufacture of superphosphates, and the increase in the amounts recovered in the manufacture of carbon disulphide.

The report gives figures for the output of some light and processing industries, including plastics for which the index in 1952-3 will be 480, compared with 200 in 1948-9, 150 in 1947 and 100 in 1935-8. Comparable figures for dyestuffs are: 159 against 100, 81, and 100.

The chemical industry, a traditional source of foreign exchange, shows a probable rapid expansion, being in a better position than some others to resume and develop exports. Most rapid developments are expected in the manufacture of products which Europe is now obtaining from the Western hemisphere, such as carbon black and certain plastics, and commodities for which increased exports are expected, such as synthetic fibres and dyestuffs.

Fertilisers

Estimated requirements of fertilisers in participating countries are given as follows: (1935-8 equals 100); nitrogen: 190 in 1952-3 against 158 in 1949-50, 142 in 1948-9 and 114 in 1947-8; potash: 177 in 1952-3 against 157 in 1949-50, 134 in 1948-9 and 108 in 1947-8; phosphates: 182 in 1952-3 against 156 in 1949-50, 142 in 1948-9 and 112 in 1947-8.

Additional use of fertilisers is required not only on tillage crops, but also on grassland, which represents over half the total agricultural area of participating countries. It is possible that even larger amounts than those quoted will be needed.

—Export indices of overseas territories given in the report include: (average 1937-8 equals 100): phosphates: 200 against 140 in 1947. The Organisation for European Economic Co-operation's figures for imports from the outside world in 1952-3 includes $100 million for fertilisers.

German Plant for Reparations.—Plant from the chemical factory Anorgana, in Gendorf, has been divided between France, Czechoslovakia and Jugoslavia under the reparations scheme.

RADIOACTIVE EMISSIONS

Sources and Nature of Possible Injury

FURTHER recognition of the increased use of radioactive materials in chemistry and process industries and of the very much wider use to be anticipated was contained in the paper recently presented before the Chemical Engineering Group of the Society of Chemical Industry by Dr. E. F. Edson, dealing with "Radiation Hazards and Their Control."

This survey of the general and medical history of the subject and of safeguards desirable in large establishments, radiation research laboratories or production plants, comes opportunely, when the trend of so many recent statements has been to foresee the very much wider use of radioisotopes in research and industry.

Radioactive materials, Dr. Edson recalled, have been used for many years in industry—notably mesothorium and radium in the luminous dial painting trade. From 1910 to 1930 the number of workers exposed to radiations (from Röntgen rays or radium) rose significantly. By the late 1920's it was evident that control of radiations was essential for health reasons and official recommendations began to be made.

Unfortunately, damage done to workers from 1900 to the 1920's still manifests itself afresh from time to time in both illness and death. To-day a conservative estimate would indicate that there are 100,000 people whose tasks bring them into regular contact with radiations.

Those connected with the development of applied radiation are determined that this important and dramatically expanding occupation shall not be a source of hazard to the life or health of its workers.

Two Types

Penetrating radiations consist of either electromagnetic waves or atomic fragments. Electromagnetic waves of longer wavelength than X-rays (ultra-violet, infra-red, radio), "excitant radiations," are not capable of causing significant ionisation of the molecule in tissues.

Electromagnetic waves of short wavelength (X and γ rays) and the particulate emissions are ionising radiations, capable of ionising molecules of living tissues. Herein lies the source of danger, because of the consequent changes produced in the biochemistry, the function and finally the form of the cell.

X- and γ-waves are capable of traversing great distances through matter of low density. When they come from radioactive elements, γ-rays are always accompanied by particulate radiation. Of these, the ones most interesting biologically are the α and β particles and the neutrons.

The other known atomic fragments (protons, mesons, deuterons, mesitrons and others) have not yet been shown to constitute separate biological problems to man.

Neutrons have no charge and can, therefore, pass fairly freely through and between atoms. When stopped, they are the cause of secondary emission of other radiations which penetrate still further. In equal physical doses, they are 4 to 10 times as effective as X-rays.

β-particles, of negligible mass and negatively charged are approximately equal in biological effectiveness to X- or γ-radiation.

α-particles, with their four units of mass and two positive charges, do not travel far but are 10 to 20 times as effective as equivalent physical doses of X- or γ-radiation.

Principal Hazards

Inhalation of radioactive material, as in dusts, aerosols, or absorption of their solutions through skin or intestinal walls, is particularly dangerous since it necessarily involves deposition of radioactive substances within the body.

The most dangerous elements are those which are readily absorbed, selectively fixed (as iodine in the thyroid), give off energetic radiations and decay slowly enough to bring about internal radiation for the entire remaining life-span of the human carrier. Such characteristics exist in radium, plutonium, strontium, cobalt and a great many other elements.

Diagnosis is made more difficult because the types of injuries produced by overdosage of radiation are almost exactly the same as those we find as normal causes of illness in man.

A table presented by the lecturer of which part is reproduced below, deals specifically with the type of injury inflicted.

Injuries known to have occurred from overexposure to uncontrolled ionising radiation.

SKIN

Single exposures.—Redness, blistering, baldness, ulceration, scarring, cancer.

Repeated exposures.—Redness, skin thinning, baldness, pigmentation, over-thickening, ulceration, cancer formation.

EYES

Lens opacities (cataracts), eye surface burns.

BONE

Bone cells proper.—*Inflammation; cell death; bone cancer (sarcoma).

Bone marrow cells (blood-forming).—Reduction of white cells or red cells in circulation. Failure to form new blood. Cancer or malignant overgrowth of blood.

LUNGS

Lungs and Bronchi.—*Fibrosis of lung; cancer of bronchial cells or lung.

By contrast, man is able to tolerate with apparent impunity small amounts of radiation from external or internal sources. The proportionality of dosage rate and biological effect is used throughout radiation protection.

One of the credos of radiation protection is adherence to the "tolerances" for radiations, either determined experimentally or calculated. Detection and measurement of the radiations is by means of photographic film badges, fluorescent screens and a number of instruments which have been previously referred to in THE CHEMICAL AGE. They include Geiger-Muller counters, electroscopes and ionisation chambers.

Control of Radiation Hazards

The major groups of protective barriers may be stated as follows:

(a) Lay-out, design and construction of establishment.

(b) Operational routines and handling of radioactive materials.

(c) Training, education and supervision.

(d) Personal protection of the worker.

(e) Detection, measurement and control of radioactive hazards.

(f) Medical surveillance of workers.

Under layout and design is included planning for minimum transportation, siting of canteens, etc., outside areas of radioactivity and providing adequate shielding of concrete, lead and steel. Use of wet processes should reduce the dust hazard and the use of smooth walls and high-gloss paints and flooring should also contribute. Sampling should be arranged by remote control.

Special Risks

Provision should be made for very full fire and disaster control gear to prevent release of the radioactive hazard in these emergencies. Generous spacing of equipment is important. Operational factors include the provision for breakdowns which are apt to result in temporary lapses of safety measures.

Safety training of all grades of the staff should be a firm policy, reiteration being needed to maintain awareness.

The extent and type of personal protection will vary greatly with the conditions. An important consequence of the use of any such devices is that a service for its provision, maintenance, inspection, repair and laundering will also be necessary.

For effective detection measurement and control a Health Physics organisation is essential which determines the extent of exposure of workers, surveys buildings and generally acts as a "detective-inspector."

If all these factors can be maintained, concluded the lecturer, as they must be, he felt that peace-time radiation work need never be checked by the possibility of endangering a future generation. It was devoutly to be hoped that the world would never again see any example of the results of uncontrolled radiation, in peace or war.

* Indicates that the effect arises more commonly from internal over-deposition of short-range particle emitting substances.

Chemistry of Plutonium

Important Studies Entrusted to Du Pont

INTENT on increasing plutonium production, one of the two fissionable materials with which the national atomic energy programme is chiefly concerned, the United States Atomic Energy Commission has announced that the E. I. Du Pont de Nemours & Company, Wilmington, Delaware, will survey all the problems of research and engineering involved in improving the chemical production processes.

Improvements in the chemical phases of the production process, the Commission said, offer the best promise of increasing the amount of plutonium produced from a given quantity of uranium, and of simplifying the handling of the wastes of the production process.

Production of plutonium from uranium, obtained by bombarding uranium atoms, is now slow and tedious. In some circumstances, materials that are useful in the manufacture of atomic bombs or the production of atomic power comprise only 1 per cent of the original uranium ore.

Complex Studies

Since it assumed direction of the atomic energy programme in January, 1947, the Commission has given close attention to developing improvements in the chemistry of plutonium. The complex studies have been undertaken by several different institutions and industrial concerns.

Besides its military uses, plutonium, scientists believe, may provide the link which ultimately will enable them to harness atomic energy for power and perhaps even to drive trains and ships.

Heretofore, the Du Pont Company participated in several aspects of the Manhattan Engineer District programme which produced the first atom bombs. It was also the builder and first operator of the Hanford Works at Richmond, Washington, the major centre of U.S. production of the fissionable element plutonium.

RECOVERY AND USES OF LITHIUM

Mechanical and Chemical Processes Examined

LITHIUM in the form of metal, salts, and alloys is particularly important because of increasing industrial uses, some of which have resulted from wartime developments. Lithium carbonate and lithium strontium nitrate, which impart a brilliant red colour to the flame, are used in pyrotechnics.

NEW CANADIAN SOURCE

WITH the location by the Northern Chemicals Company, a subsidiary of the Lithium Corporation of America, of a large deposit of spodumene, the principal ore of lithium, ninety miles north-west of Winnipeg, a new industry is being formed which may make Canada the world's leading producer of lithium. Proved reserves are conservatively estimated at 1.6 million tons, with an average of 5 per cent lithium Plants for processing the ore are expected to be built at Winnipeg. Lithium salts have vital military applications in electrochemical and other industries.

Lithium chloride and fluoride are used in fluxes for welding aluminium to dissolve the oxide coating on the aluminium and prevent oxidation of the molten metal.

Lithium carbonate is used in ceramics in raw alkaline glazes because of its unusual fluxing properties. The use of 9 to 12 per cent lithium carbonate permits a marked increase in the amount of alumina, calcium and silica that may be used and results in a more stable glaze with sufficient alkalinity to produce vivid copper blues and other typically alkaline colours.

Lithium stearate is used as a grease in aircraft engines because of its ability to withstand wide changes in temperature.

In view of its great affinity for nitrogen, hydrogen, oxygen, sulphur, phosphorus, carbon, and silicon, lithium has an excellent scavenging action on molten metals. It forms stable non-metallic compounds of low specific gravity or gases are eliminated at pouring temperatures.

Lithium is generally added to the melt in form of a lithium-calcium alloy consisting of 50 per cent of each ingredient or as an alloy of 98 per cent copper and 2 per cent lithium. The lithium-calcium alloy, added to cast iron before pouring, acts as a scavenger and increases the fluidity of the melt. This alloy also is said to increase the corrosion-resistant properties of stainless steel alloys and to improve their polishing qualities. In copper-chrome-lithium alloys for castings to carry current, the lithium alloy acts as a deoxidiser and degasifier, eliminates the chromium oxide, assures cleaner castings, and permits complicated thin-wall coring.

For Purifying Helium

The decided affinity of lithium for nitrogen is the property utilised in purifying helium. A recently developed use is in removing oxygen from the atmosphere of heat-treating furnaces. This prevents scaling of the heat-treated material and permits greater accuracy in delicate work.

In view of the many uses—new and old—of lithium and the steadily increasing demand for it, the Bureau of Mines, United States Department of the Interior, undertook detailed investigations into the recovery of lithium within the programme for the more effective utilisation of domestic resources. It published the results in Report of Investigation R14321, in which the commercial lithium minerals and their composition are shown in the table at foot of page.

Spodumene is the most important source of lithium and lithium salts. Sizable deposits of amblygonite, however, occur in the pegmatite area of the Black Hills in the central western part of South Dakota, and studies were made to obtain information on the treatment of amblygonite and to develop a method of recovering lithium from the mineral.

Some amblygonites, being comparatively pure minerals, required no benefication, but

Mineral	Simplified formulæ	Lithia content, per cent	
		Theoretical	Range in commercial minerals
Spodumene	$LiAlSi_2O_6$ or $Li_2O.Al_2O_3.4SiO_2$	8.03	4-8
Lepidolite	$LiKAl_2F_2Si_2O_5$ or $LiF.KF.Al_2O_3.3SiO_2$	4.09	2-4
Amblygonite	$LiAlFPO_4$ or $_2LiF.Al_2O_3.P_2O_5$	10.10	8-9
Triphylite	$LiFePO4$ or $Li_2O.2FeO.P_2O_5$	9.47	2-6
Petalite	$LiAlSi_4O_{10}$ or $Li_2O.Al_2O_3.8SiO_2$	4.89	2-4
Zinnwaldite	$LiKFeAl_2F_2Si_2O_{10}$ or $LiF.KF.FeO.Al_2O_3.3SiO_2$	3.40	2-3

the lower-grade conglomerates were first improved by agglomerate tabling.

The most practical method of recovering lithium from amblygonite appeared to be by conversion of the lithium to the sulphate, which could then be recovered by leaching with water.

The mineral or a high-grade concentrate of the mineral is sintered with gypsum, the optimum amount of gypsum being 10 to 33 per cent more than was required to react with the lithium in the mineral, and the optimum time and temperature of calcination were 2 hours and 950°C., respectively. An addition of lime up to 15 per cent of the weight of mineral does not materially alter the recovery of lithium.

Water-Leaching

After furnacing, the lithium in the sinter cake was recovered by water-leaching and the calcium in the leach solution precipitated as calcium carbonate. Precipitation of lithium carbonate with a sodium carbonate solution recovered 76.6 per cent of the lithium in the amblygonite as technical-grade lithium carbonate.

The lithium remaining in solution, after the recovery of lithium carbonate, was precipitated as lithium fluoride with solutions of ammonium or sodium fluorides. This recovered an additional 8.8 per cent of the lithium in the amblygonite as technical-grade lithium fluoride, making a total overall lithium recovery of 85.4 per cent.

Larger-scale tests with amblygonite were extended to sintering in rotary kilns and to leaching in rotary kilns and showed that rabbling the material in a Herreshoff-type furnace, sintering in a rotary kiln, or sintering in a stationary hearth furnace would all give approximately the same recoveries of lithia.

If a rotary kiln were used the material should be fed in the form of glomerules to minimise the dust losses. A dust-collecting system would also be necessary, as the glomerules tend to chip and spall during the furnacing period.

Several leaching experiments showed that the use of a countercurrent system of leaching with three thickeners would provide a pregnant solution of sufficient strength to give a maximum recovery of technical-grade lithium carbonate.

An experimental study to determine whether lithium could be extracted from spodumene by sintering with gypsum, or gypsum with lime, showed that recoveries of 80 to 85 per cent were obtained when the mixture was sintered at 1050° to 1150°C. for 1 to 2 hours. The optimum proportions of gypsum and lime were a 100 per cent excess of gypsum over the stoichiometric amount, and an amount of lime equal to 75 to 100 per cent of the weight of mineral treated.

The determination of lithium in the presence of sodium and potassium is very difficult. In the standard J. Lawrence Smith method the sample is heated with 1 part of ammonium chloride and 8 parts of calcium carbonate, and the sintered mass is leached with water. The aqueous extract contains calcium and the alkali metals. The calcium is removed by precipitation with ammonium carbonate and ammonium oxalate.

Lithium chloride is separated from sodium and potassium chlorides by extraction with amyl alcohol; if much lithium chloride is present the extraction will have to be repeated several times. This is a lengthy procedure and obviously would not be suited for routine plant analysis.

In the experimental work, described in the report, all analyses were made by the method of Rogers and Caley,* in which lithium may be determined in the presence of sodium and potassium by precipitation with a strongly alkaline potassium periodate solution. Other metals than the alkali metals, however, must be removed.

* Rogers, L. B., and Caley, E. R., A New Selective Reagent for Lithium : Ind. and Eng. Chem. (Anal. Ed.) vol. 15, pp. 209–211 (1943).

France's Atomic Security

Distrust of Communist Scientists

CONTROVERSY over the employment of Communists in the development of atomic energy in France has been the cause of comment in the British and American Press, with the implied accusation that such employment was a danger to military security. In Britain and the United States steps have been taken to remove Communists from posts in any way affecting national security.

M. Frederic Joliot-Curie, French High Commissioner for Atomic Energy, and himself a member of the French Communist Party, recently expressed his resentment of this attitude of the Press of the English-speaking countries.

He objected, in particular, to the assumption that because a man was a Communist he must dispense morally with his French nationality and automatically become a paid or unpaid spy.

The construction of a second atomic pile, to supplement that at Fort de Chillon which came into operation at the end of last year, was forecast by M. Joliot-Curie. He also said that his researches and those of his colleagues were confined by the Government to the peaceful aspects of atomic energy.

Progress in Medicinal and Fine Chemicals—II

Important Functions of Liver Extract

by G. COLMAN GREEN, B.Sc., F.R.I.C., A.M.I.Chem.E.

AMONG the outstanding advances announced in the medicinal chemical field during 1948 have been those concerning the isolation of the anti-pernicious anæmia factor from liver. The isolation and identification of this factor seems to have been brought to a conclusion simultaneously and independently in Great Britain and the United States (THE CHEMICAL AGE, 1948, *1510*, 851).

The work in this field may be regarded as having commenced with the work of Minot and Murphy in 1926 (*J. Amer. Med. Ass.*, 1926, *87*, 470) who discovered that rapid improvement took place when liver was fed to patients suffering from pernicious anæmia. Massive amounts were fed over prolonged periods and the treatment was inconvenient and nauseating. Consequently, attempts were made to fractionate liver and concentrate the factor concerned.

One of the earliest of these fractions was known as "Cohn Fraction G" and it was obtained by grinding liver with water and filtering after coagulation at 85°C. The filtrate was concentrated *in vacuo*, precipitated first with 70 per cent alcohol and the filtrate again precipitated with 90 per cent alcohol. The precipitate last obtained was the concentrate required (*J. Biol. Chem.*, 1927, *74*, 69; *ibid.*, 1938, *77*, 325).

This was claimed to be the first liver extract generally available. It was extremely small in bulk but extremely high in potency (*J. Amer. Med. Ass.*, 1945, *127*, 974), and was, of course, administered orally.

Liver Concentrates

During the 'thirties, further concentration and purification was achieved and eventually concentrates were obtained of such potency and purity that they became suitable for injection. In such preparations the concentration achieved was rendered 10 ml. equivalent to approximately 50 gm. of fresh liver.

This concentration was further improved in the late 'thirties and has since led to the ultimate isolation of the active principle, which has been named "Vitamin B 12."

In Britain, E. Lester Smith reported the isolation of the anti-pernicious anæmia factor in liver in April (*Nature*, 1948, *161*, 638). Crude extract was worked up and by the use of chromatographic partition procedures a concentrate containing 2.5-3.0 per cent of the active material was obtained. Digestion with trypsin and further chromatography gave a further spectacular concentration which enabled the factor to be crystallised from acetone.

Actually, two red pigments were obtained, the one being, possibly, a degradation product of the other.

Fractionation

During research it had been found that colour and activity were inseparable and this fact was used as a very convenient guide in fractionation. Four tons of liver were worked up to yield just under 1 gram of the factor.

This factor is almost certainly the classical liver factor of Minot and Murphy.

The recent work of Spies and other workers in the U.S.A. and Britain will be recalled in connection with the treatment of macrocytic anæmias with folic acid and especially the broad conclusion which has been reached, namely, that while folic acid administration promotes remission and prevents relapse in macrocytic anæmias it will not prevent or stop the neurological disturbances which accompany pernicious anæmia which are due to the sub-acute combined degeneration of the spinal cord.

It has been shown by Ungley (*Brit. Med. J.*, 1948, No. 4567, 154), who has worked with Lester Smith and been responsible for clinical trials, that the red-pigmented material—(but known to contain, however, colourless impurities)—gave improvement in the combined degeneration of the cord equivalent to that obtained by liver extract. A single intra-muscular injection of 10 μg. of the pigment gave a maximal reticulocyte response and a rapid increase in red blood cells. Lester Smith has pointed out that, at an effective dose equivalent to some 20 μg. daily, "this is one of the most potent of known physiologically active substances."

The spectacular clinical results obtained by Ungley with Lester Smith's preparation in this country have been confirmed in the U.S.A. by Castle *et al.* (*New Zealand Med. J.* 1948, *239*, 328 and Spies *et al.* (*Lancet*, 1948, *2*, 519) using the "Vitamin B_{12}" of Riches *et al.* (*Science*, 1948, *107*, 396) the isolation of which in a crystalline form was

also reported in April, 1948, and which now appears to be identical with Lester Smith's factor.

Hitherto the only means of standardising the anti-pernicious anæmia factor in liver concentrates has been by measuring response clinically with pernicious anæmia patients. The gross inconvenience of this system of standardisation from a number of points of view can be readily imagined. The British workers, even with the aid of their discovery that activity was related to degree of pigmentation, found it necessary to conduct 80 clinical tests in the course of their work.

Growth Factor

The course of concentration of the factor by the American workers was somewhat eased by the discovery of Mary Shorb (*Science*, 1948, *107*, 397) that there was in liver extract a growth factor essential to *Lactobacillus lactis*, Dorner, to which this organism gave a growth response which was almost in linear relationship with the known potency of the liver extracts used when they were standardised against pernicious anæmia patients. The use of this method of testing must considerably have lightened the burden of testing the various fractions as obtained by Rickes *et al.* (*Science*, 1948, *107*, 396) in their isolation of the factor which they have christened "Vitamin B_{12}" in the States.

As yet their method of concentration is undisclosed but they obtained a red substance crystallising as needles, whereas Lester Smith obtained two pigments which were amorphous solids.

Later, Lester Smith (*Nature*, 1948, *162*, 144) and Rickes *et al.* (*Science*, 1948, *108*, 134) both demonstrated the presence of cobalt in Vitamin B_{12}. Lester Smith, in his first paper, referred to the pigment as having a red colour similar to that of cobalt salts, but he did not at that time specifically state that cobalt was present. However, in his later paper, he reveals that there was 4.0 per cent cobalt in vacuum-dried crystals.

This is a most interesting feature of the vitamin, since cobalt has long been suspected of being an essential trace element in nutrition and it has been reported to prevent or cure anæmia in ruminants fed on cobalt-deficient pastures; and this is the first occasion upon which cobalt has been found in a compound of natural origin.

Simultaneously, Rickes *et al.* detected cobalt by emission spectrographic analysis and concluded from all the evidence that Vitamin B_{12} is a co-ordination complex with six groups (which may be different) around a cobalt atom and it is to this complex that the colour is thought to be due.

Rickes *et al.*, quoting from the literature, point out that cobalt alone does not produce response in human pernicious anæmia nor does it promote growth of *Lactobacillus lactis*, Dorner.

For the present there seems to be little possibility of the commercial production of Vitamin B_{12} (*Brit. Med. J.*, 1948, ii, 950). It hardly seems likely that it could be produced economically at the moment. However, as with other naturally occurring substances, there always remains the possibility of its ultimate synthesis or that of its functional or structural analogues. A pre-requisite is naturally the full elucidation of structure.

For the time being the treatment of pernicious anæmia will continue to rest upon the use of the various liver extracts.

It is not to be thought that the responses to be obtained in the treatment of certain nutritional macrocytic anæmias are all dramatic and clear-cut. Indeed, there are certain anæmias of this type which are partially or wholly refractory to treatment by liver injection.

Usually, the response of those subjects is more marked when the cruder concentrates are administered, indicating that there is another factor in liver, other than Vitamin B_{12}, which has been shown not to be the *Lactobacillus casei* factor.

It has been suggested that this be called the "Will's Factor" (U.S.P. Anti-anæmia Board Statement: *J. Amer. Pharm. Ass.* (Pr. Pharm. Edit.), 1948, *9*, 660).

Because of the possible risk of loss of these as yet unknown factors the board will not accept any injectable liver extract greater than 15 U.S.P. units (injectable) per c.c., while liver injection (crude) is not to exceed 2 U.S.P. units (injectable) per c.c.

Different Species

It is now permitted to market injectable liver preparations from different species. This latter concession is to enable the physician whose patient might have become sensitised to the liver extract of one species to change to that of another.

Shorb's work with *Lactobacillus lactis*, Dorner, has not only provided a useful tool by which extracts and fractions may be standardised, but it also provides a means by which a whole range of materials may rapidly be "screened" as possible sources of Vitamin B_{12} alternative to liver.

Such substances have already been "screened" and, in decreasing order of potency, the following substances have been found to possess liver factor activity for *Lactobacillus lactis*, Dorner: (a) papain digest of acid precipitate of cow manure; (b) fish meal; (c) pancreatin; (d) papain;

(e) egg white; (f) egg yolk; (g) alcoholic extracts of whey; (h) soya bean oil meal; (i) gelatin; (j) yein.

Shive *et al.* (*J. Amer. Chem. Soc.*, 1948, *70*, 2614) have explored the inter-relationship between thymidine (a purine derivative) isolated from liver and vitamin B_{12}. They had earlier found that liver thymidine prevented the toxicity of a competitive folic acid antagonist. They found that, for *Lactobacillus lactis*, Dorner, thymidine adequately replaced liver extracts containing anti-pernicious anæmia factor as growth factor.

The issue is complicated by their finding that when tomato juice was present in the medium the addition of 10 per cent aerated sterile water adequately replaced liver extract, an effect which was further enhanced by the aseptic addition of ascorbic acid (vitamin C).

Also, when enzymatic digest of casein replaced tomato juice in the medium, ascorbic acid plus aerated sterile distilled water still replaced liver extract.

The authors promise an explanation of this curious situation in due course; but, in the meantime, they conclude that, in the nutrition of Vitamin B_{12} thymidine adequately replaces B_{12} and it, therefore, seems probable that B_{12} functions in the biosynthesis of thymidine.

Subsequently, Shive, *et al.* (*J. Biol. Chem.*, 1948, *176*, 991) briefly quote experimental data which they interpret to mean that Vitamin B_{12}, the anti-pernicious anæmia factor, is probably involved in the biosynthesis of purines (or their derivatives) as well as thymidine; but, that, in turn it may well be that these substances are concerned with the synthesis of Vitamin B_{12}.

From an extension of these experiments, Shive *et al.* concludes that it is probable that folic acid and Vitamin B_{12} have independent functions to perform in the biosynthesis of thymine and thymidine.

If this is confirmed it will be interesting to see whether an attempt is made to correlate this last finding with the fact that, as already mentioned, folic acid gives symptomatic relief of pernicious anæmia but fails to stop and, indeed, may aggravate the subacute combined degeneration of the spinal cord which is a feature of the disease, which Vitamin B_{12} spectacularly relieves.

Fraenkel, Blewett and Coles (*Nature*, 1948, *161*, 981) have shown that, on an otherwise complete diet, the meal-worm *Tenebrio moliter* requires two factors for growth and survival. The first is folic acid and the second factor is a nerite filtrate from yeast or liver extract. The organism, therefore, appeared at first to be potentially valuable in the assay of and differentiation between folic acid and the anti-pernicious anæmia factor.

Unfortunately, such hopes have not been realised, since it appears that "Vitamin Bt" (the second factor for Tenebrio) was not identical with the anti-pernicious anæmia factor of liver.

(*To be continued*)

Changes in the Poisons List

THE Poisons Board has made certain recommendations to the Secretary of State for the further amendment of the Poisons List and of the Rules made under section 23 of the Pharmacy and Poisons Act, and he therefore proposes to make statutory instruments which will effect the following changes in the law relating to poisons.—

(1) 6-morpholino-4 : 4-diphenylheptane-3-one and its salts will be added to Part I of the Poisons List.

(2) Dinitrocresols will be taken out of Part I and added to Part II of the Poisons List.

(3) Bis-bis-dimethylaminophosphonous anhydride, diethyl-paranitrophenyl thiophosphate, hexaethyl tetrophosphate and tetraethyl pyrophosphate will be added to Part II of the Poisons List.

(4) 6-morpholino-4 : 4-diphenylheptane-3-one, will be included in the First and Fourth Schedules to the Poisons Rules.

(5) Dinitrocresols will be exempt from the restrictions which apply to First and Fourth Schedule poisons when sold in the form of agricultural and horticultural insecticides or fungicides. Such preparations will be excluded from the general exemption from control of all substances containing dinitrocresols and not being preparations for the treatment of human ailments; they will be the only preparations containing dinitrocresols and subject to the control of the Poisons Law, which may be sold by listed sellers of poisons.

(6) The four phosphorous compounds already named will be exempted from control when sold in any form other than agricultural or horticultural insecticides or fungicides. These preparations, and the similar preparations containing dinitrocresols, will be subject only to the restrictions imposed by their being included in Part II of the Poisons List and in the Seventh Schedule to the Poisons Rules: the form of words with which they are to be labelled will draw attention to the danger of using the preparation in an enclosed place and of allowing it to come into contact with the skin.

(7) Registered veterinary practitioners will be given the same facilities for obtaining, supplying and dispensing poisons as are enjoyed by registered veterinary surgeons.

(8) Rule 18 will be amended to provide that a poison may be labelled with the "Approved Name" given it by the General Medical Council.

(9) Rule 30 will be extended to include insulin in the list of poisons which may be manufactured under the supervision of a duly qualified medical practitioner.

(10) Rule 31 will be amended to provide that the application to be listed as a seller of poisons shall be made in duplicate and that one copy shall be endorsed by the local authority and returned to the applicant.

French Chemical Recovery

Pre-War Production Levels Regained

A RECENT survey of the French chemical industry shows rapid progress up to the end of 1947, despite war damage. France's is stated to rank third among the world's chemical industries, a remarkable recovery, considering that in January, 1945, most of her plants were at a standstill, particularly those producing sulphuric acid, which were removed by the enemy.

After three years, many branches have been able to reach the 1938 production levels and some industries, such as the sodium products, superphosphates, dyes and glass industries, have exceeded it.

Outstanding among the high output industries are soda carbonate, of which 180,000 tons was produced in 1947 against 100,700 tons in 1938; high output is also recorded of 48,700 tons against 29,000 tons; chlorates and perchlorates, 6000 tons against 3000 tons; carbon disulphide, 1660 tons against 34 tons; phosphorus and by-products, 1630 tons against 450 tons; formic acid and by-products, 1150 tons against 167 tons; electro-technical carbon, 9260 tons against 5590 tons.

Total chemical exports for 1947 were worth 14,330 million francs.

Tinplate Plan

ECA Funds for New French Plant

THE use of ECA funds for helping to finance a French industrial project which is expected to result in a large increase to France's tinplate production has been approved by the Economic Co-operation Administration. The applicant for dollar credits through the French government is J. J. Carnaud & Forges de Basse-Indre, France's largest producer of tinplate. Its plant is near Nantes on the Loire.

ECA funds are to finance the purchase in part of American-made machinery and equipment. Deliveries will require 14 months, and the total cost of production equipment obtained from American suppliers is expected to be $2 million.

The company's tinplate production capacity will, it is expected, be increased from 50,000 to 100,000 metric tons annually, it was said. France's present tinplate capacity is expected to be raised from 125,000 tons to 175,000 tons.

Raw material needed for the increased tinplate production will become available in 1949 in the form of hot rolled sheets from a new plant now being constructed at Denain-Anzin in northern France.

Reports on German War Industries

THE Board of Trade announces that six BIOS and FIAT reports, published on January 3 on Germany's wartime industry are now available.

There are, in addition, a number of reports which were not regarded as being suitable for immediate publication. The Technical Information and Documents Unit is now making summaries of these which will be sent to industrial and research centres. Copies will also be available for inspection at the TIDU offices at 40 Cadogan Square, London, W.1.

The six new reports are :—

BIOS 1813. I.G. products for the leather industry (HMSO, 3s.).

BIOS 1816. The "Sodingen" process for the recovery of ethylene from coke-oven gas (2s. 6d.).

BIOS 1817. German peat industry (4s.6d.).

BIOS 1823. German carbon industry and hydraulic press manufacture. (2s.)

BIOS/Misc. 112. Dutch report on additional information on various catalytic processes in Western Germany—1 (British zone) (5s. 6d.).

FIAT 1294. The thermal cracking of ethane—Oppau process (2s. 6d.).

The subjects which are now being summarised include the following :—

F.D. 3000/48. Heraklith plant of Deutsche Magnesit A.G. at Ferndorf, Austria (lightweight building slabs).

F.D. 3002/48. German plastic developments Homogenholzwerke Holig. G.m.b.H., Baiersbronn, near Freudenstadt, Schwarzwald.

F.D. 3004/48. Interview with Dr. K. Fredenberg, directeur of Institut für Die Chemie des Holzes, Universität, Heidelberg (lignin chemistry in relation to industrial utilisation).

F.D. 3005/48. Lurgi Gesellschaft für Warmetechnik m.b.H., Lurgi Gesellschaft für Chemie und Hutterwesen m.b.H., Lurgi Apparatebau G.m.b.H. (apparatus for sulphite pulp manufacture).

F.D. 3006/48. Lurgi Gesellschaft für Warmetechnik Frankfort (equipment for sulphite waste liquor concentration).

F.D. 3012/48. Vereinigte Flusspatgrueen G.m.b.H., at Stulln (United Fluorspar Mines) (manufacture of hydrofluoric acid and chlorine trifluoride).

F.D. 3027/48. Hochfrequenz Forschungsinstitut of Dr. Plendl, Thumersbach, Austria (detection of short radar waves and infra-red radiation).

F.D. 3028/48. Prof. H. Bartel's Laboratory Technische Hochschule, Hannover (infra-red research).

F.D. 3264/48. Rubber reinforcing carbon blacks from naphthalene and anthracene (CK3 and CK4) blacks.

Protection of Chemical Inventions—II

by JAMES G. FIFE, M.Sc., Ph.D., F.R.I.C.

In the previous part of this article (THE CHEMICAL AGE, *January* 8) *the author dealt specifically with a case in which Boots Pure Drug Company successfully sought the revocation of Letters Patent granted to two other chemical companies. The latter, May and Baker, Ltd., and Ciba, Ltd., sought to defend their position by restricting by amendment the claims of their patent. The judge, however, rejected the amendment and revoked the patent.*

I REFRAIN from making any comments on the merits of the proposed amendments, in view of the fact that an appeal is pending; but the patentees' task would clearly have been much less difficult if the claims had been very much more limited.

Again, the patentees were in a difficult position in that if the claims had been limited originally to the two specific compounds described in the examples it might well have pointed the way for another party to take all the benefits of the patentees' invention while avoiding the claims by discovering some other sulphonamide which could be made in the same way and which would give the same or better results.

Another difficulty which is encountered by inventors of chemical processes in a particularly acute degree is the question of invention by selection. This, of course, also occurs in other types of patents to a certain extent but the position arises far more often in the chemical field.

The nature of an invention by selection may perhaps be best explained by way of example. Let us suppose that an inventor has found that a certain reaction can be carried out effectively in the presence of an acid and he mentions perhaps specific acids, such as acetic acid and lactic acid, but his claims cover acids in general.

Plagiarism

It may well be that a later inventor finds that a particularly good result is obtained by the use of a particular acid not mentioned in the earlier patent, for example stearic acid. Now the second inventor can obtain a valid patent limited to his acid, even although it falls within the claims of the earlier patent and although the use of the patented process would infringe the claims of the earlier patent; but in order to obtain a valid selection patent, the patentee must comply with certain conditions which were very clearly set out by Mr. Justice Maugham, as he then was, in the case of the patents of I.G. Farbenindustrie A.G.[4] and which were expressed by the judge as follows:

"Three general propositions may, however, I think, be asserted as true:—First, a selection patent to be valid must be based on some substantial advantage to be secured by the use of the selected numbers. (The phrase will be understood to include the case of a substantial disadvantage to be thereby avoided.) Secondly, the whole of the selected members must possess the advantage in question. Thirdly, the selection must be in respect of a quality of a special character, which can fairly be said to be peculiar to the selected group."

Doctrine of Utility

The first proposition is plain (*see* the statement of Mr. Justice Parker in Clyde Nail Co., Ltd., v. Russell (1916), 33 RPC 291, page 305). I will add that this condition must not be assimilated with the doctrine of utility as applied to an originating patent. In such a patent there may well be invention without utility. In a selection patent the condition that there must be a substantial advantage attributable to the use of the selected members is inherent in the so-called invention.

The second proposition is derived from the circumstances that, if the selection embraces selected members which do not possess the alleged advantages, the selection is defective and the patent would be misleading and would also fail for insufficiency and non-utility. It is not, however, intended to suggest that a few exceptions here and there would be regarded as invalidating the patent.

The third proposition requires a little explanation. If there are 5000 possible members of the group, and 100 have been selected as possessing some new and definite advantage, it is not intended to assert that such a selection patent would be bad if it were shown as the result of further research that there existed another 100 members possessing the same advantage.

If, on the other hand, it were to be established that there were a 1000 unselected members which possessed the same advantage, I doubt very much whether the patent could be sustained. The quality must be of a special character. It must not be one which those skilled in the art will expect to find in a large number of the members.

It would be rash to attempt a closer definition; for the question is ultimately one of appreciation. Returning to the same old fashioned metaphor I would say that the

citadel must be defended, and that there is no reward if the gates have been opened at the first blast of the trumpet.

It should be obvious, after what I have said as to the essence of the inventive step, that it is necessary for the patentee to define in clear terms the nature of the characteristic which he alleges to be possessed by the selection for which he claims a monopoly. He has in truth disclosed no invention whatever if he merely says that the selected group possesses advantages.

Adequate Definition

Apart altogether from the question of what is called sufficiency, he must disclose an invention; he fails to do this in the case of a selection for special characteristics, if he does not adequately define them. The cautions repeatedly expressed in the House of Lords as regards ambiguity have, I think, special weight in relation to selection patents.

It will be appreciated that the question of selection must often arise in the case of chemical inventions and obviously in this case the specification must be drafted with great care. From what has already been said, it will be appreciated that the task of drafting a specification to protect a chemical invention in an effective manner is often a very difficult one and some of the more pessimistic may perhaps consider it an impossible task, at any rate in some cases.

Nevertheless, with adequate co-operation between the inventor and his professional advisers it should usually be possible to overcome the difficulties. In my opinion, there is no standard form which can be laid down for the drafting of patent specifications but there are certain principles which should be taken into consideration.

Firstly, it is very important to decide what is the discovery upon which the invention is based, since this is usually necessary to determine what really is the inventive step or steps made by the inventor.

Secondly, a decision will have to be arrived at as to how narrowly or how widely the invention will have to be claimed.

The complete specification will generally begin with an introductory paragraph stating the field with which the invention is concerned and this may be followed by a description of the known state of knowledge of the art including the defects or shortcomings of the prior proposals, followed by a statement of the discovery upon which the invention is based, which in turn can be followed by what is usually known as a statement of invention, that is, a statement agreeing with the main claim.

It may be that the statement of the discovery is identical in substance with the statement of invention in which case it may well be omitted. Generally, then follow statements as to preferred features of the invention, followed by some detailed examples as to how the invention is carried into effect in practice.

In this connection, it is important to set forth the best means of carrying out the invention known to the applicant at the time of the filing of the complete specification, since it is a ground upon which the patent can be held invalid if this statement is omitted.

The descriptive portion of the specification may suitably conclude with statements concerning the advantages of the invention whereafter the claims are set forth. The claims are a very important part of the specification because they define the monopoly which is to be granted to the applicant and in the absence of any definition clause in the claims, the words of the claims will be given their ordinary meaning.

Usually the specification contains a number of claims; generally all the claims after the first are dependent on the first claim directly or indirectly with the exception of the claim to the examples and the product claim which as has already been mentioned must be limited to the products when produced by the process claimed.

It may, however, in some cases be advantageous to have more than one independent claim, particularly if it is doubtful if the first claim is valid, because this will facilitate amendment at a later stage should this become necessary after the patent has been granted. In such a case it is usually advisable to have a statement of invention corresponding with each one of the independent claims.

In the case of a synthesis consisting of a number of steps it is often most effective to direct the main claim to the last step or the essential step of the synthesis, since this may give very good protection, while avoiding many of the difficulties.

The Omnibus Claim

At one time it was thought that the claim to the examples, or what is usually known as the omnibus claim, was of very little importance, because in general it is the narrowest claim in the specification; but a recent decision of the House of Lords[5] seems to indicate that an omnibus claim may be held to be valid and infringed even when all the other claims are held to be invalid and in some circumstances an omnibus claim may be given a wider construction than some of the preceding claims. It therefore seems advisable to include an omnibus claim for what it is worth.

As has already been indicated, a patent may be held to be invalid on a very large number of grounds, all of which are set forth

in Section 25 of the Patents Act. The most important of these are lack of novelty, lack of subject-matter, ambiguity, insufficiency of description and lack of utility.

Of these, anticipation usually arises because of some prior publication not known to the applicant and in some cases it may be possible to cure this defect by amendment, if possible before any action is commenced.

Lack of subject-matter often arises from the same cause but even more often from too wide claiming of the invention, unless, of course, the patentee has not in fact made an invention at all, in which case the defect is incurable.

Ambiguity usually arises because the area of monopoly is not defined clearly in the claims but it may arise from other causes. In general it is a defect which could be avoided by careful drafting.

With regard to insufficiency of description, this again can arise because the inventor either by misunderstanding or by design has not given the fullest or clearest possible description of the invention and obviously great care should be taken to explain the invention as carefully as possible, bearing in mind that in an action the matter will not be decided by a chemist but by a Judge of the High Court who possibly has no scientific knowledge and must rely for his instruction upon the expert witnesses, who are unlikely to agree, at any rate on some points.

The objection with regard to lack of utility often arises through too wide claiming of the invention. The hexyl resorcinol case and the sulphathiazole case illustrate the difficulties which can arise under this ground of invalidity. Another familiar instance in which this difficulty arose was in the well-known diazotype case[6] in which the first claim read as follows:—

"A process for making diazotypes by exposing under a transparent original a layer containing a diazo-compound decomposable by light, and then developing, wherein there is present in the finished picture a reducing agent.

Lack of Utility

It was shown in evidence that many reducing agents were unsuitable and Mr. Justice Clauson, as he then was, held that on the evidence (a) some five or six of the very numerous bodies comprised in the preferred classes of reducing agents were effective, (b) others of the same bodies would be incapable of producing the desired result, but would be known to a competent chemist as unsuitable, (c) others of the same bodies would not be so known, but their suitability could be tested by simple experiment; that, assuming in the patentee's favour that claims 1 and 16 covered only the use of reducing agents which he had indicated to be suitable, the fact that many of these bodies were useless rendered the claims bad for want of utility.

It appears from this case that even though a competent chemist would know that a reducing agent would be unsuitable, this did not save the patent from being held invalid on the ground of lack of utility.

The present British Patent law, although satisfactory in many respects, has a number of defects and this was recognised by the appointment in 1945 of a departmental committee under the chairmanship of Mr. Kenneth Swan, K.C. Mr. Swan's committee held many meetings and heard evidence from interested parties and has issued three very valuable reports[7], which it is hoped will form the basis of an amending Act at an early date.

Product Claims

Some of the proposals of particular importance contained in the reports of the Swan Committee may be mentioned. From the point of view of chemical patents, one of the most important is the proposal that it should be possible in this country to direct a claim to a new chemical substance without limitation to the process of manufacture; in other words, to have product claims which are usual in the U.S.A.

This would undoubtedly overcome many of the difficulties in chemical patents, but it may be that the proposal goes a little too far in that it would be possible for a patentee to obtain a claim to a new chemical substance by giving a description of one method of producing that substance which method might not be very satisfactory and thereby be enabled to obtain royalties from later inventors who devised improved processes for producing the same substance.

A proposal of an intermediate nature was made by the Joint Chemical Committee and will be found on page 42 of the Memorandum on Patent Law Reform by the Joint Chemical Committee, which was a committee representing all the principal chemical bodies set up to consider the matter and to give evidence before the Swan Committee. However, the Swan Committee, while recognising the problem, considered it advisable to go further than the proposals of the Joint Committee and to allow chemical product claims entirely free from any limitation.

The Swan Committee also proposes that the comptroller should have greater powers in the refusal of applications and in particular he should have powers to refuse applications on the ground of lack of subject-matter and lack of utility.

These particular proposals of the Swan Committee have given rise to much con-

(Continued at foot of following page)

New Route to Dicalcium Phosphate

Two Overseas Applications for English Patents

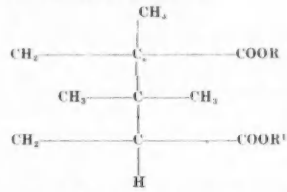
A BETTER method of producing dicalcium phosphate from acid solution containing fluorine, calcium, and phosphoric acid is claimed in the English patent application No. 14904/1948, by De Directie van de Staatmijnen in Limburg (Conv. date 17.6.47).

Recent study of the effect of the presence of fluorine on the citrate solubility of calcium phosphate has led to a new method of manufacturing this phosphate from solutions containing fluorine. Such a phosphate may be produced by adding an acid solution containing F, Ca, H_3PO_4, together with a neutralising agent such as ammonia, continuously to an acid medium, *e.g.*, nitric acid, of which the *p*H during neutralising is kept between 1.5 and 2.5.

The product consists of dicalcium phosphate mixed with calcium fluoride, and is a fertiliser of high solubility in the citrate solution. If desired, the molal relation CaO/P_2O_5 may be adjusted for neutralising in such a way that the amount of calcium present is just sufficient for combining with all the phosphoric acid and fluorine. There is no formation of fluor-apatite. Neutralising may be done in two or more stages.

Double Camphorates

Several double camphorates are already known, such as those of the acid and neutral types, with lithium, magnesium, calcium, and ammonium base, also with organic bases. In the English patent application No. 15561/1948 Luxema Soc. Anon. claims a new method for production of camphorates of the general formula



These may be obtained from camphoric acid reacted successively with two basic compounds to obtain products of the above formula in which R and R^1 are different, one of the bases being of odd valency. The starting point can also be an acid camphorate, which is reacted with a base to form a product of the same formula. The two basic compounds may be alkaloids—one or two according to the starting material.

In example (1), 200 parts camphoric acid are dissolved in 600 c.c. water to which are added 36.95 parts lithium carbonate; the reaction mixture is heated to boiling point and kept at that temperature until evolution of CO_2 ceases. Seventeen parts ammonia are then added, with formation of double camphorate of Li and NH_4, by crystallisation.

In other examples use is made of (2) ferric chloride and magnesium carbonate; (3) acid lithium camphorate and hexamethylene-tetramine; (4) hexamethylene-tetramine camphorate and lithium carbonate; (5) camphoric acid, Li carbonate and hexamethylene-tetramine; etc. Numerous other organic bases may be used.

PROTECTION OF CHEMICAL INVENTIONS

(Concluded from preceding page)

troversy, but in my opinion they are sound in that they will prevent the grant of those patents for so-called inventions of a worthless nature, as an example of which I would mention the patent[8] which was granted to I. G. Farbenindustrie A.G. in 1927 for the manufacture of a motor-car tyre from vulcanised synthetic rubber, synthetic rubber being at that time a well-known substance.

In this case claim 1 read as follows:—"The process for the manufacture and production of tyres for vehicles which consists in submitting the plastic products obtained by the polymerisation of butadiene to a process similar to that used in the production of tyres from rubber and producing thereby an elastic tyre."

It will be appreciated that I have been able to give only a brief sketch of a very complicated subject; but if it will have made the chemist who is not acquainted with patents more interested in the subject I shall have been amply rewarded. I believe that one of our troubles in this country is that, so far, we have not been sufficiently patent-minded as compared with other industrial countries, such as the U.S.A., and it may well be that British industry has suffered as a result.

REFERENCES

[1] Sharp & Dohme *v.* Boots Pure Drug Co., Ltd., 44 R.P.C. 367 and 45 R.P.C. 153.
[2] United Kingdom Specification No. 219922.
[3] May & Baker, Ltd. and Ciba, Ltd.'s Patent 65 R.P.C. 255.
[4] I.G. Farbenindustrie A.G.'s Patents 47 R.P.C. 289.
[5] Raleigh Cycle Co., Ltd. *v.* Miller, 65 R.P.C. 141.
[6] Norton & Gregory, Ltd. *v.* Jacobs, 54 R.P.C. 58, 271.
[7] Patents and Designs Acts Reports of the Departmental Committee. Cmd. 6618, 6789 and 7206.
[8] United Kingdom Specification No. 299037.

NEW AMERICAN INSTRUMENTS

Gas Detection and Vapour Pressure Study

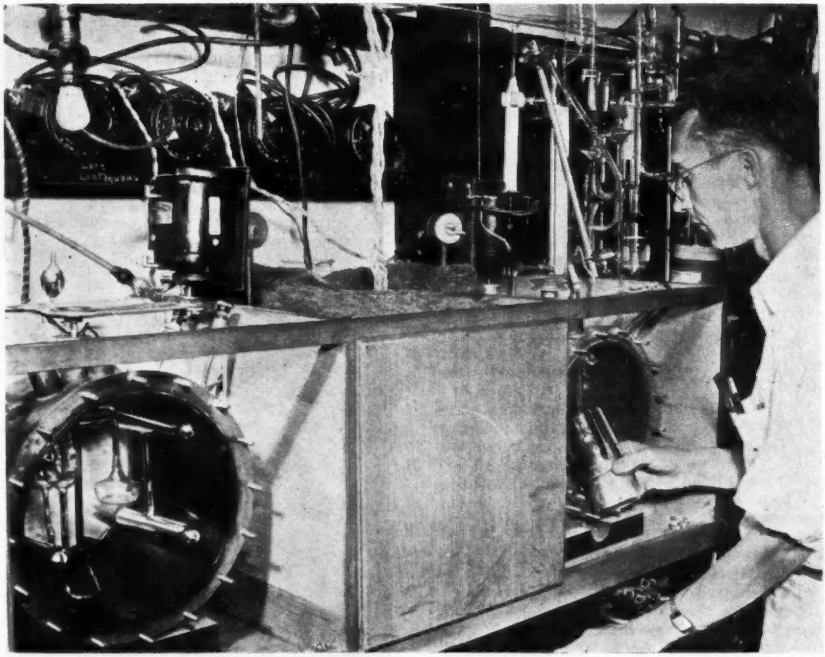
A NEW, highly sensitive differential manometer that will detect pressure differences as small as one-millionth of an atmosphere over a range of total pressure from 1 mm. of mercury to 1 atm., operating on the principle of the aneroid barometer, has been developed by Mr. Harry Matheson and Mr. Murray Eden, of the U.S. National Bureau of Standards.

Reporting on the development, the Bureau describes the manometer as being particularly useful in vapour-pressure work, since less than a drop of liquid is sufficient to compare an unknown vapour pressure as a function of temperature with that of a known liquid. It is added that the instrument can be used to compare pressures of gases, organic vapours, and non-corrosive liquids.

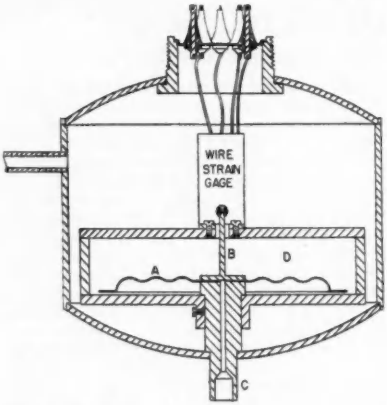
The rest point of the manometer is insensitive to temperature, and accidental pressure differences as high as 1 atm. introduce only temporary hysteresis effects. A readily portable instrument, the manometer need not be levelled before operation.

While a number of devices for measurement of absolute vacuum or pressure differences have been available to the laboratory worker, many such gauges do not operate satisfactorily in the presence of vapours. Other common disadvantages of previous models cited are large "dead volume," inconvenience of handling or moving, difficulty or slowness of manipulation, lack of precision, and sensitivity to temperature.

When, in connection with a study at the Bureau of high-polymer plastics in solution, it became necessary to compare solution vapour pressures accurately, the lack of suitable apparatus encouraged the designing of a new instrument, which in this instance is



Employing the specialised method of comparison of vapour pressures of organic liquids and solutions : the liquids are placed in the bulbs in the baths (left and right), and the manometer, concealed in the closed bath (centre), is interposed between the vapours of the two



The manometer in cross - section, showing the capsule formed by the diaphragms (A), the rod (B), through which change of position is transmitted to the wire resistance gauge and thence to the galvanometer for recording. The materials for comparison are admitted at C; D is a vacuum compartment

expected to prove useful in other fields of research. It may also be advantageously substituted for slope gauges and other commercial devices for the measurement of small pressure differences.

The Bureau's instrument measures a pressure difference as the change in the separation of a pair of nesting diaphragms indicated by an unbounded wire-resistance displacement gauge. The two diaphragms are soldered together at their edges to form a very thin capsule into which is admitted one of the vapours whose pressure is to be compared. The other vapour surrounds the capsule.

One of the diaphragms is attached to a stationary support through which vapour enters the capsule; the other is connected to the displacement gauge. The four resistance wires of the gauge are arranged to form a Wheatstone bridge, in which an increased separation of the diaphragms elongates one pair of wires and shortens the other pair. A decrease in the diaphragm spacing has the opposite effect.

The resistive unbalance, indicated by a galvanometer, gives an accurate measure of the separation of the diaphragms, and thus of the pressure difference. The capsule and gauge are sealed in a vacuum chamber.

Tests of the new manometer at the Bureau have shown that its sensitivity is not appreciably altered when the active elements are used at temperatures between 20° and 50° C. for values of absolute pressure between 1 mm. of mercury and 1 atm. The elements can withstand a differential pressure of 1 atm. where the greater pressure is external to the capsule, or a pressure difference of 0.2 atm. in the other direction.

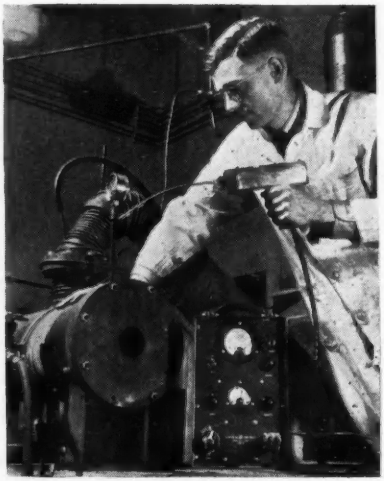
The equality of two pressures may be found to 0.001 mm. of mercury; the direction and magnitude of a pressure inequality may be determined between 0 and ±0.5 mm of mercury.

The indicated rest point remains constant within 0.005 mm. of mercury for periods of at least one day, even though the device may be subjected during this time to pressure differentials of the order of 0.2 atm. and temperature variations of several degrees.

Sensitive Detector

An interesting piece of test equipment announced during the year by the U.S. General Electric Company was a new detector for certain gases so sensitive that that would sound an alarm even if the leak were so small that only 1 oz. of freon would escape in a century.

Based on the principle that the emission of ions from the hot filament of a sensitive element is increased by the presence of a halogen gas (including fluorine and chlorine), the instrument can be used wherever the unit is to be tested, such as sealed piping systems or pressure containers, contains one of these gases, or where freon can be injected to serve as a tracer.



The gas detector in use

American Chemical Notebook

From Our New York Correspondent

THE E. I. Du Pont de Nemours Company announced this week that it is instituting a programme of grants-in-aid to 10 American universities for the 1949-50 academic year for unrestricted use in the field of fundamental chemical research. The programme, at first on a trial basis, is stated to aim at "stock-piling basic knowledge." The universities to which grants-in-aid of $10,000 each are being offered in the academic year of 1949-50, include California Institute of Technology, Cornell University, Harvard University, Massachusetts Institute of Technology, Ohio State University, Princeton University, Yale University, University of Illinois, and University of Wisconsin. The grants are expected to continue for five years. The universities themselves will select the research projects in which the grants will be employed, the only stipulation being that they be free from any commercial implications at the time the work is initiated. There will be full publication of the results of this research.

* * *

Mr. Alfonse Tammaro, manager of the Chicago (Illinois) Operations Office of the Atomic Energy Commission, has announced the signing of a contract with the Westinghouse Electric Corporation, of Pittsburgh, for the construction of an experimental nuclear reactor to meet specifications for eventual use for ship propulsion. Guided by the requirements set by the U.S. Navy Department's Bureau of Ships, the project aims, said Mr. Tammaro, "to produce a nuclear power plant which may be adapted to the propulsion of a naval vessel within the shortest practical time." In Washington, Navy officials welcomed news of the contract pointing out that an atomic power plant in a large ship would eliminate thousands of tons of weight now represented by boilers, propulsion equipment and fuel oil. The saving in weight could be utilised in strengthening the ships' armour and armament.

* * *

World demand for castor oil having reached unprecedented heights, resulting from discovery of hundreds of new uses for it in the synthetic field, Brazilian industrialists are stated to be planning the large-scale establishment of refineries in Brazil for processing castor beans. This news comes from the Brazilian Government Trade Bureau.

Aliphatic esters, widely used as raw materials and as solvents, will become more abundantly available through the "American Hydrocarbon Synthesis," according to claims made by the U.S. Industrial Chemicals Company, Inc. From the four organic acids and the large number of alcohols provided by the synthesis it is stated that a great variety of esters can be produced. The prospect is held out that in addition to the familiar ethyl acetate and butyl acetate compounds, a number of esters not previously produced on a commercial scale will be available.

* * *

Esters like normal propyl acetate, normal propyl propionate, and normal butyl propionate will be of immediate interest to lacquer manufacturers. Propyl acetate has properties intermediate between those of ethyl acetate and butyl acetate. Propyl propionate and butyl propionate are similar in properties to butyl acetate and amyl acetate, respectively. The normal-amyl acetate to be produced will be similar in properties to the fermentation amyl acetate currently in use, but is expected to have better solvent power for many materials because it is a normal ester.

* * *

Marking its entrance into the industrial chemical field, the National Distillers Products Corporation announces that it is to construct a $10 million plant for the manufacture of metallic sodium and chlorine. The corporation has entered into a contract with the E. I. du Pont de Nemours company to obtain licences for the manufacturing processes involved. The plant will be erected and operated by a wholly owned subsidiary of National Distillers. The company has been engaged in several chemical enterprises in the past and its decision to go forward with this project will permit a desirable diversification of its operations, it was said.

* * *

During the first 22 months of the Atomic Energy Commission's isotope programme, the U.S. Government made 2901 shipments of isotopes, according to Dr. Paul C. Aebersold, of Oak Ridge, Tennessee. More than 70 per cent of the shipments, 2103, he said, were made for studies in animal and human physiology. Studies in plant physiology and bacteriology accounted for 6 per cent of the shipments and the remaining fields of use, comprising chemistry, physics, industrial research and metallurgy, consumed 20 per cent.

Serious Risks of Air Pollution

Lives of 13,500 Said to Have Been Endangered

REPORTING preliminary findings in his investigations of the Donora, Pennsylvania, "smog" which asphyxiated 20 persons on October 30, 1948, Dr. Clarence A. Mills, head of the Department of Experimental Medicine in the University of Cincinnati's College of Medicine, said that the tragedy barely missed being a "major catastrophe."

Entire Township Endangered

Recalling that fumes from a Donora zinc smelter were suspected of causing the deadly pollution of the atmosphere, Dr. Mills, who is an expert on harmful effects of air pollution and on the effect of climate changes on peoples, said that a large part of the city's population of 13,500 was made ill and "a slightly higher poison concentration in the air or a few hours longer time and the whole community might have been left almost devoid of life."

Dr. Mill's findings are based on a house-to-house canvass still being conducted by the Borough Council at Donora.

More than 5000 of Donora's inhabitants are now found to have been affected, and in addition to the human fatalities roughly 800 animals were killed, Dr. Mills reported.

Of the 7670 residents questioned, 3212 reported serious effects on that night; 603 of them were treated by physicians and 277 others sought medical aid unsuccessfully.

Giving warning of the dangers of "industrial pollution poured into the air," Dr. Mills said the chance of early effective action to clear the Donora air seemed very slight.

Dr. Mills reports that the Donora smelter now is operating at lower oven temperatures and at about two-thirds the previous output. All near-by residents assert that conditions are now greatly improved. The atmospheric tests may therefore not be representative.

Previously, Prof. Frank J. Gucker, Jr., of the University of Indiana, pointed out that smog could be averted by a simple electrical device which filters factory smoke.

Observing that the smog so frequently found in industrial areas results when water vapour condenses upon particles of dust and smoke in the air, Dr. Gucker said that there were several methods of eliminating the particles, the most obvious of which is passing fumes through a fine filter.

Arresting Aerosols

"This would not be a practical way of removing commercial dusts," he said, "such as those put out by smelters and cement works, which may be a considerable economic waste and health hazard.

"These aerosols may be removed rapidly and completely by means of a high voltage electric discharge, which charges the individual particles and draws them over to one of the electrodes where they are deposited. Such an arrangement as the Cottrell precipitator will deposit tons of material in the course of a day."

Swiss Industries Fully Occupied in 1948

THE December issue of the quarterly *Bulletin*, published by the Swiss Credit Institute, Zürich, states in its review of the Swiss economy during the past year that the chemical and pharmaceutical industries have been fully occupied. Exports were approximately at the same high level of the previous year. In particular, exports of dystuffs—two-thirds of the total went to European countries—have shown a further increase, but exports of chemicals for the textile, leather and paper industries have declined sharply. In addition, this latter group has been badly hit by exchange control regulations abroad.

The relatively new branch of the Swiss chemical industry devoted to the manufacture of agricultural chemical products and insecticides, a branch which depends greatly on sales abroad, has so far not been able to secure sales in foreign markets on the scale of its productive capacity.

Exports of pharmaceutical goods conformed to no uniform pattern. Sales to the dollar areas developed favourably, but those in the European market shifted from finished specialities to basic products.

The raw material and fuel supply position of the Swiss chemical and pharmaceutical industries improved considerably during 1948. While the United States continued to be the main source, Germany, the *Bulletin* points out, is again gaining in importance. Attempts to increase imports of raw materials and intermediate products from France and the sterling area have been impeded by high prices and varying qualities.

Employment prospects are not as favourable as they have been until quite recently for, although export figures have so far been satisfactory, import restrictions imposed in many countries are bound to affect sales abroad of Swiss chemical and pharmaceutical products.

Technical Publications

INDICATIONS of some trends in Czech science, especially metallurgy, are afforded by the *Hutnicke Listy*, a monthly review of the Czechoslovak Metallurgical Works (National Corporation) and of the Czech Foundrymen's Association, in a paper by Mr. Miroslav Sicha, of Moravska Ostrava, on "A New Method of Micro-analytical Determination of Aluminium in Steel — Modified Oxyquinolinecyanide Method." The method is based on the precipitation of aluminium by an 8 per cent $NaHCO_3$ solution. The precipitate is filtered off, dissolved and aluminium is determined as an aluminium-oxyquinolate in the presence of accompanying elements (as Fe, Cu, Ni, Mo, Co, eventually Ti, U, Sn), these being changed either to complex cyanides, or separated by re-precipitation of aluminium oxy-quinolate in an aluminium acetate medium.

* * *

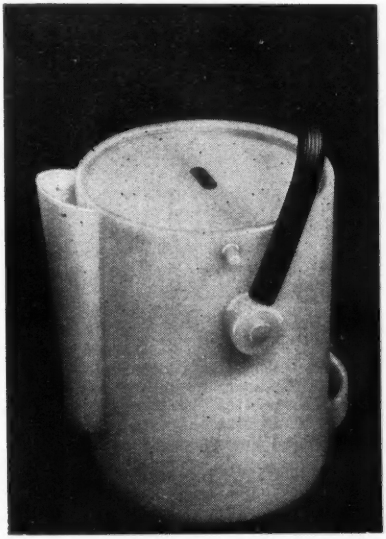
A comprehensive statement, in book form, of its history, constitution and aims has been issued by the Institute of Fuel. Formed in 1927 under Sir Alfred Mond (later Lord Melchett), the institute was incorporated by Royal Charter in 1946. The volume gives the bye-laws, education scheme, awards, meetings and publications of the institute. There are full lists of fellows, members, associate members, associates and students. There is also a useful summary of papers (with their authors), published in the Journal of the Institute of Fuel giving volumes and page numbers for easy reference.

* * *

The simple forms of vacuum filtration are the subject of the Doulton Chemical Stoneware catalogue, section No. 7, just issued. In this, attention is called to the advantages of chemical stoneware vacuum-operated filters used for batch filtration of chemicals or drugs of a corrosive nature: simplicity of construction and installation; ease of cleaning; resistance to corrosive attack, and low upkeep cost.

* * *

The possibility of fire wherever large quantities of goods or commodities are stored can never be ignored, but the danger can be considerably reduced. "Fire Protection Notes for Storage Buildings," technical booklet No. 4, issued by the Fire Protection Association deals only with the underlying principles but may serve a useful purpose in making for greater alertness to fire risks. The importance of the segregation of commodities is pointed out and under a sub-heading "Spontaneous Heating" are listed substances which are liable to initiate a temperature rise, either by chemical combination with others, or by self heating. This brief list picks out strong mineral acids (nitric, sulphuric and hydrochloric); oxygen carriers, such as, nitrates, chlorates, peroxides, and permanganates; finely divided carbon (vegetable and animal blacks), finely divided metals (magnesium, aluminium, zinc, and others), and metallic sulphides; linseed and other drying oils; quicklime, calcium carbide and metallic sodium and potassium.



The use of polythene and very practical design make this jug a safe and effective container for acids and other corrosive liquids

(Photo by courtesy of Rediweld, Ltd.)

* * *

A simple means of maintaining electrical equipment in a safe condition is the Terratertia test unit described by Electro Methods, Ltd., London, N.W.4, in their latest leaflet. Methods of installation, testing, and general uses are adequately set out.

Gold Watches for Dunlop Workers.—Presentation was made of 200 gold watches to Fort Dunlop employees (with a total of more than 9000 years' service) by Mr. W. W. Foster, general works manager, at a New Year's tea party. The average service of each recipient is 45 years.

Home News Items

Long Service.—Six employees of John Riley and Sons, Ltd., Hapton Chemical Works, Hapton, near Burnley, Lancs., have received gold watches from the managing director, Mr. W. Collison, for 40 years' continuous service with the firm.

Coal Production.—Total coal output in Britain in the first week of 1949 was 365,900 tons less than the corresponding week last year, but 341,000 tons of this was estimated to be due to holidays. The production figures are: Last week, 3,717,500 tons (3,624,400 deep-mined, 93,100 opencast).

Paint Works Explosion.—While experiments on a varnish preparation were being carried out in the research laboratory of Messrs. E. J. R. Lovelock, Ltd., Manchester, last week, there was a sudden explosion. Drums of oil caught fire, and metal and glass fragments were scattered over neighbouring houses. The outbreak was confined to the top floor, and there were no casualties.

Pantomime.—More than 1000 boys and girls between the ages of six and 12—all children of employees of I.C.I., Ltd., Dyestuffs Division, Huddersfield—attended a special pantomime matinee at the Palace Theatre, Huddersfield, on January 7. The visit was arranged by an I.C.I. works committee for the children, who afterwards received a shilling, an apple and an orange.

Steel Orders from Overseas.—The Steel Constructional Co., Ltd., Shieldmuir, Wishaw, Lanarkshire, has received an order for five crane structures for the docks at Hong Kong, which were badly damaged during the war. Another order is for eight overhead crane structures for Sweden. The production of oil-drilling derricks is to be resumed, and already an order for these has been received from the Burmah Oil Co., Ltd. Products for export in 1949 will constitute 75 per cent of the entire output.

25,000 Tons of Water Daily.—Technical experts supported the Shell Refining and Marketing Company's appeal last week at a Ministry of Health inquiry at Ellesmere Port, for permission to sink twelve boreholes for water on their 400-acres estate at Thornton-le-Moors. The company seeks to produce 25,000 tons of water a day for the new refinery at Thornton-le-Moors. It is proposed to sink four boreholes. The scheme is opposed by Cheshire County Council and Chester and Runcorn Rural Council. Evidence for Shell had not been completed when the inquiry was adjourned. It will be resumed next week.

Developing Fish Products.—The Fishmeal Manufacturers' Association, of Grimsby, is sponsoring a factory in Hull which will be opened shortly to make protein products from fish. The formula is said to be a development of a German invention of some years ago.

Morgan Crucible at Wirral.—Development of the Neston district of Wirral—in particular the introduction there of a new industry by the Morgan Crucible Company, concerned principally with fireclay processes—is one of the reasons for the Birkenhead Gas Committee's proposal to carry out extensions costing more than £206,000.

R.I.C. Anniversary.—The 30th anniversary of the North-Western section of the Royal Institute of Chemistry was celebrated on January 6, when 170 members and friends attended a dinner in Reece's Restaurant, Parker Street, Liverpool, at which Mr. H. Wetherall was the chairman. Among the guests was Prof. L. H. Briggs, of Auckland University, New Zealand, who is making a tour of Europe and the United States.

Petrol Caused Hull Disaster.—At the inquest at Hull this week on the 12 killed by fire and explosion at the British Cocoa Mills on November 29 the coroner commented on the fact that petrol tanks, a leak from one of which caused the disaster, were accommodated beneath the offices; 6000 gallons of petrol were circulating in the building at ordinary times. A verdict of "accidental death" was returned in each case.

Inequitable Taxation.—The Federation of British Industries has made strong representations to the Chancellor of the Exchequer that the Profits Tax operates unfairly, ordinary shareholders having to bear their own and the preference shareholders' contribution. One alternative suggested by the FBI is that the tax should be abolished and the impost on corporate earnings should be restricted to general income tax.

The Groundnut Scheme.—The disappointment stated to have been felt by some in the results of the groundnut scheme in Tanganyika, was referred to by Sir John Russell, the authority on chemistry of the soil, in his address at the recent annual conference of the Le Play Society, at Oxford. Recalling that it had been suggested that the scheme was a failure, he said if that was so it was through no fault of the scientific or technical staff, who had not had a chance to do their work properly. The main problem, he said, was the effective use of African labour.

Personal

THE following appointments have been announced by Glaxo Laboratories, Ltd., Greenford, Middlesex. Directors: SIR JEREMY RAISMAN, formerly of the Indian Civil Service; SIR MAURICE HUTTON, former head of the British Food Mission in the U.S.A., and DR. HECTOR MCDONALD WALKER, whose election to the board marks the significance the company attaches to research. DR. THOMAS FOTHERINGHAM MACRAE, appointed an executive director, joined the company in 1946, since when he has been in charge of the research laboratories at Greenford. MR. HERBERT WILLIAM PALMER has been appointed deputy managing director in succession to the late Mr. Archie Sandercock.

LORD MCGOWAN, K.B.E., D.C.L., LL.D., chairman of Imperial Chemical Industries, Ltd., has accepted an invitation to become the first patron of the Purchasing Officers' Association. The organisation, which a controller of purchases of I.C.I., Ltd., founded in 1931, now has a membership of 1750 purchasing officers in all branches of industry and public administration.

MR. W. W. FOSTER, Dunlop Rubber Company's general works manager at Fort Dunlop, and MR. S. SMITH (engineering section) have sailed for the U.S.A. to visit the Dunlop factories at Buffalo, U.S.A. and Toronto. They will also see rubber plants at Detroit, Jackson and Akron. The object of the visit is to discuss industrial problems common to America and Britain to get an accurate idea of the relative production efficiencies.

The appointment of two new directors is announced in the current issue of *The Shell Magazine*. MR. J. W. PLATT has been elected to the board of the "Shell" Transport and Trading Co., Ltd., and has been appointed a managing director of the Anglo-Saxon Petroleum Co., Ltd., and of the Shell Petroleum Co., Ltd., and also a non-delegate member of the board of De Bataafsche Petroleum Maatschappij. Mr. Platt joined Shell in 1922 and has spent more than 20 years overseas in China and Argentina. MR. H. WILKINSON, C.M.G. has also been elected to the board of the "Shell" Transport and Trading Co., Ltd. He joined the Asiatic (now the Shell) Petroleum Co. in May, 1922, has served in Singapore, South Africa, and the United States. He was awarded the C.M.G. in 1946 for his services during the last war as British Petroleum representative in Washington, D.C.

Sir John Russell, authority on soil chemistry, who has been installed as the 111th president of the British Association

SIR GORDON MACDONALD, Governor of Newfoundland, may be the next chairman of the North-West Divisional Coal Board, with a salary of £4500 a year—when he returns to this country in April. He would succeed ALDERMAN J. A. WEBB, a former Mayor of Salford, who has been given leave of absence owing to ill-health, and who, it is believed, may not return to duty. Sir Gordon Macdonald was North-West Regional Controller of the Ministry of Fuel and Power before leaving for Newfoundland.

MR. CARL S. MINER, founder and director of the U.S. Miner Laboratories of Chicago, which have taken a leading part in the development of the furfural industry in the U.S.A., received the 1949 Perkin Medal of the American Section of the Society of Chemical Industry at a dinner held at the Commodore Hotel on January 7.

MR. B. GREGMAN, technical director of Bamag, Ltd., is leaving on January 24 for a three weeks' tour which will take him to Karachi, Bombay and Calcutta, and to Damascus on his return flight. He can be reached c/o Mr. L. W. Richards, the Bamag resident engineer, West End Hotel, Marine Lines, Bombay.

DR. HAROLD HARTLEY, deputy chairman of Radiation, Ltd., has been appointed chairman in succession to MR. J. F. DAVIES who has retired from the board.

LORD and LADY LEVERHULME are leaving London on January 20 for a trip to Australia and New Zealand. They will return *via* Canada in June.

Overseas News Items

German Lead Mining.—Exploitation of a lead deposit which has recently been discovered near Virneburg in the Eiffel Mountains of Western Germany, is to commence at an early date.

India and Atomic Energy.—India does not wish to lag behind other countries in developments of nuclear physics, says Dr. K. S. Krishnan, president of the All-Indian Science Congress, announcing that an Atomic Energy Commission is to be set up. It will be answerable to Pandit Nehru, the Prime Minister.

Belgian Chemicals.—The Belgian chemical industry has now joined the ranks of other Belgian industries the activity of which has recently shown a noteworthy decline. Manufacture of glass and ceramics has also been affected. However, the position of the pharmaceutical industry is reported to be relatively good.

120,000 Forced Labourers? — Evidence given recently at Frankfurt by an escaped German, Emil Walter, suggests that Russia is using some 120,000 persons under forced labour conditions in the uranium-ore mines in Saxony, adjoining the Czechoslovak border. Of this number, at least 30,000 were said to be women.

Antwerp Refinery Project.—The Anglo-Iranian Oil Company and the Compagnie Financiere Belge des Petroles (Petrofina) announce a joint agreement to construct an oil refinery at Antwerp. The two companies will form a company, Societe Industrielle Belge des Petroles, in which they will hold equal interests. Intake capacity will be initially 30,000 barrels of crude oil a day.

Power Scheme for Australia.—A vast new hydro-electric project on the Snowy River is planned by the Commonwealth, Victorian and New South Wales Governments. The scheme will cost between £100 and £185 millions and will be the largest undertaken in Australia. Power will be produced by a large number of power stations, requiring seven main dams, between 80 and 100 miles of tunnels through the Australian alps and 500 miles of race lines for feeding the water into the system. Special precautions will be taken to protect the system from atom bombing and other forms of modern warfare, many water channels being underground.

Explosion at Potash Works.—An explosion on January 5 at a potash works near Cologne, which damaged a number of buildings and injured 20 people is stated to have been caused by children playing with a shell, which exploded.

U.S. Sulphur Production.—400,657 long tons of native sulphur were produced in the U.S.A. during September, 1948, according to reports of producers to the Bureau of Mines, U.S. Department of the Interior. The total production in the first nine months of 1948 was 3,624,619 long tons, and producers' stocks at the end of September stood at 3,313,777 long tons.

World Tin Stocks.—World production of tin concentrates in October was 13,300 long tons, compared with the September post-war record of 13,400 tons, reports the International Tin Study Group at The Hague. Malayan production, for the first time since the war, exceeded 4000 tons. Indonesia, 2726 tons, equalled its maximum of May last. World stocks of tin metal at the end of September were 143,700 tons, nearly 6000 tons less than at the end of August.

South African Soap Enterprise.—The successful salt water soap powder, devised by a young Port Elizabeth chemist, after examining more than 1000 formulations in his laboratory, is expected to go into commercial production this year in the form of cakes of toilet and washing soap. Several salt water soaps now available have not been an unqualified success and difficulty was experienced in clearing U.S. surplus war stores of such soap manufactured for the American Navy.

Aluminium Boom Anticipated. — Mr. Richard S. Reynolds, Jr., president of the Reynolds Metals Company, second largest aluminium producing company in the U.S.A., predicts that the demand for aluminium in 1949, barring any sharp change in business conditions, will set new records for the industry. "The industry's policy of low prices and high production during the three years since the war ended," he said, "has attracted many key industries to aluminium. The aluminium industry has telescoped into the three post-war years as much market development as would ordinarily take two decades to accomplish."

Borax Anniversary

50 Years' Pioneering and Development

TUESDAY this week marked the completion of 50 years' expanding activity by Borax Consolidated, Ltd., the great chemical undertaking which grew out of pioneer work undertaken in the face of extraordinary difficulties in Death Valley, California, where the mineral deposits were first exploited. The present company was formed in 1899 by amalgamation of interests brought about by the late Mr. R. C. Baker, managing director until 1937, and Mr. James Gerstley, Sen., who still serves the organisation as a consultant.

420,000 Tons in 1947

Some idea of the growth of the borax industry—the company now recalls—can be judged from the fact that the world output from all sources, which approximated in terms of boric oxide something like 20,000 tons in 1899, had reached a total in 1947 of 153,400 tons, 95 per cent of which came from California. Borax contains 36.5 per cent of boric oxide, so that the 1947 output is equivalent to 420,000 tons of borax.

The fields of use in industry today bear very little comparison with those 50 years ago, when borax and boric acid were sparingly employed.

The most notable developments have been in the ceramic field comprising a wide range of technical, optical and container glasses, vitreous enamels, and pottery and chinaware glazes, which account for roughly half the world's consumption of boron products. In the U.S.A. the pre-fabricated Lustron house, built and equipped in porcelain enamelled steel, is to be the forerunner of 45,000 planned for erection in 1949.

Perhaps the greatest discovery in recent times was the role of boron as a fertiliser in agriculture, first commercially used in 1934 now acccounting for many thousands of tons of borax. More recently, the use of borax and boric acid for salt-glazed stoneware pipes and conduits, and of borax for coating steel wire prior to lubricating and drawing are promising lines of development. Boron is also commanding attention in atomic research and neutron radiography.

As raw materials and processs chemicals in abrasives, adhesives, detergents, electrolytic condensers, leather, metallurgy, paint, paper and the chemical industry itself, borax and boric acid have well recognised functions.

Borax Consolidated, Ltd. has been intimately concerned with all these developments and its very active research department and technical sales section are likely to play a leading part in maintaining the pace in the future.

A New Insecticide

Heightened Potency of TEPP

A NEW insecticide for the control of aphids, mites, and other plant pests has been developed by Albright and Wilson, Ltd. Extensive field trials and commercial experience have now established its use.

TEPP (tetraethyl pyrophosphate) is a development from the established insecticide HETP (hexaethyl tetraphosphate). The basis of both HETP and TEPP is tetraethyl pyrophosphate but the latter is reported to contain about 40 per cent to the 20 per cent of the former. Qualitatively similar, with the quantitative difference, TEPP is substantially the more potent.

TEPP, the company reports, is a mobile liquid miscible with water, ethyl alcohol, acetone, carbon tetrachloride, o-dichlorobenzene, pine oil, benzene, toluene, and xylene, but not freely miscible with petroleum ether or other paraffin hydrocarbons.

At the recommended concentrations TEPP has been used safely on many plants in different parts of the world without phytotoxic action. The only example of plant injury so far recorded is some evidence of scorch on tomatoes.

Precautions

It is recommended that precautions should be taken with the new insecticide as it is toxic to warm-blooded animals and should be handled with care in the undiluted state; rubber gloves should be worn. The wearing of eye shields and the prohibiting of eating, drinking and smoking in the spraying area are recommended.

The boiling point of tetraethyl pyrophosphate (pure) at 0.5 mm. Hg. is 128°C. This corresponds with the saturated vapour pressure for TEPP, which is so low that the vapour even from the concentrated substance is not considered as a source of danger.

As a safety precaution TEPP has been coloured purple by the addition of a small amount of dyestuff. When diluted for spraying, the solution has a faint pink colour.

The company emphasises that TEPP is a specialised insecticide, most usefully employed on certain groups of plant pests, of which the most important are aphides (all species, including the woolly aphis); mites (red spider, citrus red mite, two-spotted spider mite and bryobia mite); and greenhouse thrips.

Boots' New Experimental Farm.—Boots Pure Drug Co. has acquired a second Scottish farm—West Drums, at Brechin—to be used for testing horticultural preparations. Apart from this use it will be run as a commercial farm, breeding cattle and raising crops. This is the fourth farm which the company has established.

Next Week's Events

MONDAY, JANUARY 17

Society of Chemical Industry. Leeds: University, 6.30 p.m. J. H. Garner and M. Lovett: "Trade Effluents."

Sir John Cass Technical Institute. Department of Chemistry. Jewry Street, Aldgate, E.C.3, 6.30 p.m. First of a course of eight lectures. N. W. Roberts: "Thermodynamics for Chemical Engineers."

TUESDAY, JANUARY 18

Society of Chemical Industry. Chemical Engineering Group. London: Burlington House, W.1, 5.30 p.m. J. W. Steventon and K. A. Sherwin: "Granulation of Compound Fertilisers: Some Current Production Problems and Developments." Fine Chemicals Group. London: King's College, Strand, W.C., 7 p.m. Discussion. James Walker and P. M. D'Arcy Hart: "The Approach to the Chemotherapy of Tuberculosis."

Institute of Petroleum. Manchester: Engineers' Club, 6 p.m.

Hull Chemical and Engineering Society. Hull: Church Institute, Albion Street, 7.30 p.m. Presidential address. H. L. Coulson: "The Polishing of Metals."

Chemical Society. Leicester: University College, 5.30 p.m. Prof. M. Stacey: "The Chemistry of the Fluoro-Carbons."

WEDNESDAY, JANUARY 19

Society of Chemical Industry. London Section and Plastics Group. Royal Institution, Albemarle Street, W.1, 6.30 p.m. Jubilee Memorial Lecture. H. V. Potter: "Synthetic Fibres: Historical Survey of the Development of Some Synthetic Fibrous Materials."

Manchester Metallurgical Society. Engineers' Club, 6.30 p.m. J. I. Morley: "Metallography of Stainless and Heat-Resisting Steels."

Royal Institute of Chemistry. London and South-Eastern Counties Section. Royal Society of Medicine, 1 Wimpole Street, W.1. Prof. W. Wardlaw: "The Ministry of Labour and the Profession of Chemistry."

THURSDAY, JANUARY 20

The Chemical Society. London: The Royal Institution, Albemarle Street, W.1, 7.15 p.m. Tilden Lecture. Prof. F. E. King: "Three- and Four-Membered Heterocyclic Rings." Northern Ireland: Queen's University, Belfast, 7.30 p.m. Joint meeting with local sections of the Royal Institute of Chemistry and Society of Chemical Industry. Sir Jack Drummond: "Nutritional Theories Reviewed in the Light of Wartime Experience."

Sir John Cass Technical Institute. Department of Chemistry. Jewry Street, Aldgate, E.C.3. First of a series of ten lecture demonstrations, 6 p.m. David W. Wilson: "Microchemical Analysis."

The Fertiliser Society. London: Holborn Restaurant. General meeting, 11 a.m. G. R. Davies: "Studies in the Caking of Fertilisers"; K. A. Sherwin: "Wood Meal as a Conditioning Agent in Mixed Fertiliser"; D. P. Hopkins: "Caking and Setting of N.P.K. Fertilisers"; G. W. Ettle: "Some Chemical Aspects of the Manufacture of Ammonium Sulphate."

FRIDAY, JANUARY 21

Society of Chemical Industry. Glasgow: Food Group with Glasgow Section. Dr. J. B. M. Coppock: "Some Aspects of Bakery Research."

The Chemical Society. South Wales: University College, Swansea. Joint meeting with University College of Swansea Students' Chemical Society, 6 p.m. Prof. R. D. Haworth: "The Oxidation of Phenols."

Institution of the Rubber Industry and Plastics Institute. Manchester: Engineers' Club, 6.45 p.m. Dr. J. A. Hetherington: "Applications of Acrylic and Vinyl Pastes."

Institute of Physics. Manchester: University, 7 p.m. T. Bedford: "Environmental Warmth in Relation to Human Comfort."

Society of Glass Technology. St. Helens: Radiant House Gas Showrooms, 7.15 p.m. S. T. Pickering: "Optical Glass."

Society of Dyers and Colourists. Manchester: Gas Department Showrooms, 6.30 p.m. Dr. T. Vickerstaff: "A Study of the Factors Controlling Dyeing Behaviour."

Institute of Metals. Sheffield Local Section. Grand Hotel, 6.30 p.m. R. C. Jewell: "Thermocouples."

Industrial Measuring Instruments

An exhibition covering a wide range of industrial measuring instruments is to be held by Marconi Instruments, Ltd., in their London showroom, 109 Eaton Square, S.W.1, next month.

Among the exhibits will be the latest *p*H meters and moisture meters, a range of industrial recorders, general-purpose instruments for differing applications, and a number of working models.

Admission will be by tickets available from Marconi Instruments, Ltd., St. Albans, Herts., or the London showroom.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

AIR CONTROL INSTALLATIONS, LTD., Ruislip. (M., 15/1/49.) November 25, debenture, to Lloyds Bank, Ltd., securing all moneys due or to become due to the bank; general charge. *Nil. June 10, 1948.

CHEMO-PLASTICS, LTD., London, W.C. (M., 15/1/49.) November 22, £2000 debenture, to H. Presman, London, general charge. *£3240. October 28, 1947.

Satisfactions

EXCHANGE OIL CO., LTD., Liverpool. (M.S., 15/1/49.) Satisfaction December 1, of charge registered November 28, 1933.

FROME CHEMICAL CO., LTD. (M.S., 15/1/49.) Satisfaction December 4, of charge registered November 22, 1946.

MASSON SEELEY & CO., LTD., London, S.W. (M.S., 15/1/49.) Satisfactions December 2, of debentures registered January 27, 1931, June 21, 1935, and March 25, 1941.

PORTSLADE BY-PRODUCT CO., LTD., Shoreham-by-Sea. (M.S., 15/1/49.) Satisfaction December 2, £1100, registered July 6, 1945.

POWER SPECIALITIES, LTD., Slough. (M.S., 15/1/49.) Satisfactions December 2, £20,000 (not ex.), registered Feb. 18, 1942, £20,000 (not ex.), registered January 28, £8000 (not ex.), registered February 20, £20,000 (not ex.), registered July 21, and £22,000 (not ex.), registered December 31, 1943, and £25,000 (not ex.), registered July 21, 1944.

Company News

The name of **H. Gelpke, Ltd.**, has been changed to **Gelpke & Bate, Ltd.**

The registered capital of **L. B. Holliday (Holdings), Ltd.**, has been increased from £100 to £1.25 million.

The address of **Laboratory Suppliers, Ltd.**, has been changed from 15 Central Chambers, Ealing Broadway, to 41 The Mall, Ealing, W.5.

New Companies Registered

A. & W. Chemical Co., Ltd. (462,747). Private company. Capital £5000. Manufacturers of chemicals, gases, fertilisers, oils, colours, etc. Directors: L. J. O'Hanlan and W. Wall. Reg. office: 10 and 12 Copthall Avenue, E.C.2.

Anatile, Ltd. (462,970). Private company. Capital £100. Manufacturers of natural and synthetic plastics, rubber, chemicals, etc. Directors: W. S. Freeman and R. B. Geanor. Reg. office: 4 Wormald Row, Leeds, 2.

Builders Chemicals (Newcastle), Ltd. (462,809). Private company. Capital £1000. Manufacturers of chemicals. Directors: L. French, and A. I. Tate. Reg. office: 64 Reid Park Road, Newcastle-on-Tyne.

Cabot Carbon, Ltd. (462,857). Private company Capital £100. Manufacturers of carbon blacks, synthetic rubber, chemical substances, paints, etc. Solicitors: Slaughter & May, 18 Austin Friars, E.C.2.

Carless Capel & Leonard, Ltd. (462,696). Private company. Capital £450,000. To acquire the business of petrol and naphtha refiners and chemical manufacturers formerly carried on at Hope Chemical Works, Lea Chemical Works, Pharos Oil Works, Hackney Wick, and St. Clements Wharf, Bow, E., as "Carless Capel & Leonard." Directors: H. R. Leonard, J. G. Leonard, J. M. Leonard, A. W. Lawson, O.B.E., and Lt.-Col. J. C. Brown, D.S.O. Reg. office: Hope Chemical Works, Hackney Wick, E.9.

Charwood (Sales), Ltd. (462,822). Private company. Capital £1000. Manufacturers and refiners of charcoal, carbon, chemicals, oils, etc. Directors: V. J. Froom, F. Sommer, and J. L. Michnik. Reg. office: 8 Broadway, Westminster, S.W.1.

William Openshaw, Ltd. (462,745). Private company. Capital £3000. To acquire the business of William Openshaw, hitherto carried on at 41 Highfield Road, Cheadle Hulme, as "W. Openshaw & Son," and to carry on the business of chemical lead plant manufacturers, makers of lead linings, etc. Directors: W. Openshaw, J. G. Openshaw, and A. Openshaw. Reg. office: Grange Works, Cheadle Road, Cheadle Hulme, Ches.

Chemical and Allied Stocks and Shares

THE Palestine news led to caution in the stock markets at the beginning of the week, but the general volume of business improved, and any decline in prices of British Funds and leading industrial shares attracted buyers. British Funds were again

higher on balance, and shares of chemical and allied companies have generally been well maintained, although some which recently moved strongly ahead have lost part of their advance.

Glaxo Laboratories, for example, touched £25 before profit-taking brought the price back to £22⅝. Imperial Chemical changed hands slightly over 49s., Fisons were again around 59s. and Monsanto Chemical 62s. 6d. Turner & Newall, which remained under the influence of the excellent impression created by the consolidated accounts, were firm at 84s. Dunlop Rubber were 76s. and British Aluminium steady at 50s. 9d.

British Oxygen have been well maintained at 102s. 6d., the view persisting in the market that when the expected new issue is made it will take the form of an offer on favourable terms to shareholders. The better tendency in shares of companies connected with plastics was again in evidence, British Xylonite rising afresh to £6¼, while¼ in response to the financial results, British Industrial Plastics 2s. shares have strengthened to 7s. 1½d. Kleemann were 23s. and, in another department, Tube Investments have been favoured, changing hands up to £6¾.

United Molasses firmed up to approximately 51s., but in other directions British Plaster Board after rising over 26s. on merger talk (which was subsequently denied) reacted to 25s. 7½d. The 4s. units of the Distillers Co. have been active around 29s. 9d. British Glues at 21s. 6d. continued to attract a fair amount of attention, and, on expectations of the dividend being maintained, Blythe Colour Works showed firmness at 61s. 3d. Borax Consolidated at 63s. 9d. were inclined to move higher, and Boots Drug at 56s. 3d. have been well maintained.

Iron and steel shares continued to receive only moderate attention, despite the attractive yields and the good grounds for expecting dividends to be maintained until 1950, when nationalisation is scheduled to be effected. Guest Keen have eased to 49s. There was a little profit making in colliery shares, although it is being assumed in some quarters that compensation in cash may be forthcoming this year for coke-ovens and other "outside" assets. Generally, however, it is felt that compensation cannot yet be forecast on a satisfactory basis.

Amalgamated Metal shares have firmed up slightly to 21s. 4½d. More attention was given to building and allied shares, Associated Cement rising to 79s. on reports of a big contract for cement in respect of an important road building scheme for South Wales.

Albright & Wilson 5s. shares were again around 31s., and Amber Chemical 2s. shares 9s. 3d. Burt Boulton & Haywood held their recent rise to 28s. 9d., British Tar Products 2s. 6d. shares were 8s. 9d., and Midland Tar Distillers 35s. Nairn & Greenwich at 78s. 9d. have been firm on the financial results. Beechams deferred eased to 17s. 7½d., Sangers were 34s. 9d., British Match 35s. 6d., but Lever & Unilever lost a few pence at 50s. 10½d. after an earlier gain. The Palestine news put Anglo Iranian back to £9, Shell eased to 74s. 4½d. and Burmah Oil to 72s. 6d.

British Chemical Prices

Market Reports

ACTIVE trading conditions have been reported on most sections of the industrial chemicals market and the movement in the aggregate to the home consuming industries has been fairly substantial. Export inquiry, too, has been well maintained with buyers looking for firm delivery dates. A steady call for red and white lead has been dealt with at the recently increased rates and paint raw materials generally are in good request. Barium chloride has been the subject of steady inquiry following the home makers' announcement that supplies will shortly be available. British made formaldehyde continues in good demand at firm quotations. There has been nothing of special interest to report of the soda compounds and the routine movement against delivery specifications is believed to be satisfactory. The coal tar products market has been without feature, with a steady trade in most items. Pitch is an active item both on home and export account.

MANCHESTER.—The Manchester chemical market is now pretty well into its stride again after the seasonal dullness; inquiry and actual new business have both been fairly active during the past week. Home trade users are specifying for good deliveries of the alkali and other products already on order and a steady movement of supplies on export account is reported. Prices generally maintain a strong front and recent advances have been well held. There is a good demand in most sections of the fertiliser trade, especially the phosphatic materials. Tar products generally are moving readily into consumption.

GLASGOW.—The Scottish chemical market has presented virtually a "nil return" for a week, most firms having been closed for the greater part of the week for the New Year holiday. In the export market, conditions have been unchanged, but more hopeful news has come from Sweden.

Patent Processes in Chemical Industry

The following information is prepared from the Official Patents Journal. Printed copies of specifications accepted will be obtainable, as soon as printing arrangements permit, from the Patent Office, Southampton Buildings, London, W.C.2, at 1s. each. Higher priced photostat copies are generally available.

Complete Specifications Accepted

Production of high-speed steel powder and articles produced therefrom.—F. Watson. (N. K. G. Tholand.) March 3, 1943. 612,105.

Heat-treatments for nickel-manganese-chromium steels.—Bristol Aeroplane Co., Ltd., and P. H. Frith. March 29, 1945. 612,106.

Manufacture of sheets and coatings of plastics.—E. V. Giles. July 16, 1943. 612,504.

Manufacture of compound sheets comprising fabric and plastic material.—E. V. Giles. Aug. 17, 1943. 612,505.

Reinforced plastic materials.—H. Kremer. Nov. 24, 1943. 612,506.

Separation of iron ores by froth flotation.—American Cyanamid Co. Dec. 10, 1942. 612,107.

Application of metal coatings to metal surfaces.—F. B. Dehn. Sept. 21, 1944. 612,412.

Method and apparatus for producing crumb rubber from a butadiene-styrene copolymer.—Firestone Tyre & Rubber Co. Aug. 7, 1943. 612,509.

Anti-corrosion treatment for metal and other surfaces.—C. W. J. Allen. Nov. 8, 1944. 612,510.

Production of industrial oils by polymerisation of olefins.—Usines de Melle. Dec. 7, 1942. 612,109.

Synthetic resin compositions.—Anglo-Iranian Oil Co., Ltd., E. S. Narracott, and K. J. Rowland. March 29, 1945. 612,416.

Production of polymerisable esters.—L. Berger & Sons, Ltd., F. Armitage, J. A. Cottrell, and D. H. Hewitt. April 17, 1945. 612,311, 612,312.

Process of sterilisation and purification of air.—H. Corblin. Nov. 10, 1943. 612,418.

Processes for removing oxide from the surfaces of metals and alloys.—Hooker Electrochemical Co. June 2, 1944. 612,419.

Hydrogenation of 2 : 3-dihydro pyran-5-carboxylic acid salts.—I.C.I., Ltd., J. G. M. Bremner, and D. G. Jones. June 20, 1945. 612,314.

Machine for cutting a clearing groove behind the cutting edge of tools.—Soc. Française Bedaux. Aug. 9, 1944. 612,420.

Hydrocarbon conversion.—A. H. Stevens. (Phillips Petroleum Co.) Oct. 2, 1945. 612,423.

Manufacture of alkali chromates.—Soc. d'Electro-Chimie d'Electro-Metallurgie et des Acieries Electriques l'Ugine. July 6, 1942. 612,517.

Apparatus for reactions between gases, liquids and solids.—Solvay & Cie. July 4, 1942. 612,518.

Manufacture of quinoline compounds.—E. P. Newton. (Parke, Davis & Co.) Oct. 23, 1945. 612,115.

Manufacture of silica articles or articles formed in part of silica.—E. J. Ambrose, and H. G. Lubszynski. Oct. 22, 1945. 612,519.

De-pulping of fibrous plant parts.—N.V. Werkspoor. March 9, 1944. 612,428.

Process and apparatus for the production of high concentration caustic lyes from the decomposition of amalgams.—Solvay & Cie. Feb. 18, 1944. 612,322.

Refining of phenothiazine.—Kopper Co., Inc. June 22, 1944. 612,323.

Process for the manufacture of isoprene.—Rubber-Stichting. Jan. 8, 1944. 612,429.

Production of granulated fertilisers on the basis of ammonium nitrate.—Appareils & Evaporateurs Kestner. Feb. 27, 1943. 612,522.

Synthetic rubber base wrinkle composition.—N. T. Beynon. June 9, 1945. 612,325.

Moulding materials and method of producing same.—A. Amigo, and B. Deutsch. Feb. 5, 1946. 612,121.

Hydrogen-cyanide recovery.—Koppers Co., Inc. Oct. 14, 1942. 512,122.

Sizing of paper fibres, and the like.—National Oil Products Co. May 10, 1945. 612,326.

Process for improving the crease-resistance of textile material.—N.V. De Bataafsche Petroleum Maatschappij. Nov. 19, 1943. 612,527.

Process for polymerising polymerisable substances in the form of an emulsion.—N.V. De Bataafsche Petroleum Maatschappij. May 2, 1945. 612,331.

Preparation of fibrous material for spinning.—W. H. Schneider. March 19, 1946. 612,529.

Evaporating caustic soda solutions.—I.C.I., Ltd., A. G. M. Hedley, F. M. Joscelyne, and J. C. H. McEntee. March 25, 1946. 612,530.

Higher alkoxy silicon halides and materials treated therewith.—J. G. Fife. (Dow Chemical Co.) March 29, 1946. 612,125.

Manufacture of $\Delta 5$: 6-3-oxy-steroids and derivatives thereof.—W. W. Groves. (T. Reichstein.) April 10, 1946. 612,129.

Systems for controlling the temperature of air in a building, vehicle, or other enclosed space.—R. Mercer. (Vapor Car Heating Co., Inc.) April 10, 1946. 612,439.

Manufacture of 11-dehydrocorticosterone and derivatives thereof.—T. Reichstein April 11, 1944. 612,130.

Hydrocarbon wax compositions.—Atlas Powder Co. April 30, 1945. 612,440.

Containers for fragmentary and like material and methods of loading and unloading the same.—F. G. Mitchell. May 23, 1946. 612,534.

Conveyers and methods of operating the same.—F. G. Mitchell. May 23, 1946. 612,535.

Apparatus for filling receptacles, such as jars, bottles, and the like, with liquids.—Arenco A/B. April 28, 1945. 612,338.

Multi-diameter crusher.—Nordberg Manufacturing Co. April 13, 1945. 612,339.

Contact terminals for vacuum tubes and the process for sealing the terminals on the tubes.—A. B. Du Mont Laboratories, Inc. May 2, 1945. 612,341.

Process and apparatus for measuring the magnetic susceptibility of fluids.—Gas Light & Coke Co., and A. R. Morcom. May 9, 1946. 612,142.

Phosphate coating processes.—Pyrene Co., Ltd., M. Barent, and S. W. Johnson. May 11, 1946. 612,151.

Direct reading *p*H meters.—S. R. Wilkins, and E. J. Tunnicliffe. May 13, 1946. 612,155.

Fluid catalyst catalytic cracking.—Shell Development Co. June 1, 1945. 612,159.

Synthetic resins.—British Resin Products, Ltd., E. M. Evans, and H. Thurston-Hookway. May 14, 1946. 612,166.

Bleaching of fatty oils and fats.—Lever Bros. & Unilever, Ltd. May 15, 1945. 612,169.

Separable slide fastener.—United States Rubber Co July 26, 1945. 612,172.

Polyazo dyestuffs.—J. R. Geigy, A.G. May 16, 1945. 612,174.

Heat treatment of heat-resisting alloys and of articles or parts made therefrom.—Mond Nickel Co., Ltd., and L. B. Pfeil. May 16, 1946. 612,181.

Process and device for drying filaments.—J. J. Stockly. May 17, 1946. 612,197.

Process and device for producing wool-like rayon filaments.—J. J. Stockly. 612,198.

Saponification of high tenacity cellulose ester yarns.—British Celanese, Ltd. May 17, 1945. 612,206.

Saponification of cellulose ester yarns.—British Celanese, Ltd. May 19, 1945. 612,207.

Manufacture of crotonic acid.—British Celanese, Ltd. May 19, 1945. 612,346.

Manufacture of acedianthrone derivatives.—I.C.I., Ltd., S. Coffey, D. A. W. Fairweather, F. Lodge, and J. Wardle-Worth. May 20, 1945. 612,222.

Manufacture of stabilised synthetic rubber lattices.—C. Arnold. (Standard Oil Development Co.) May 21, 1946. 612,252, 612,253.

Polymerisation and interpolymerisation of ethylene.—E. I. Du Pont De Nemours & Co. May 22, 1945. 612,266.

Beta-halo acyl halides and method of producing the same.—B. F. Goodrich Co. June 20, 1945. 612,271.

Metal shearing, riveting, punching, or like machines.—A. E. Cartlidge. May 23, 1946. 612,378.

Apparatus for dispensing measured quantities of liquids.—J. S. Sanders, and W. Rook. May 23, 1946. (Addition to 516,855). 612,292.

Process for the production of araliphatic amines.—J. R. Geigy Akt.-Ges. May 8, 1945. 612,301.

Pyrotechnic devices for producing disturbances under water.—Imperial Chemical Industries, Ltd., R. J. Doyle and S. H. Lucas. May 23, 1946. 612,452.

The production of aminobenzene-sulphonamidohalopyrazines.—American Cyanamid Co. June 26, 1945. 612,385.

Production of cyclohexane. — Anglo-Iranian Oil Co., Ltd., S. F. Birch, and F. A. Fidler, and O. M. K. Collis (legal representative of C. B. Collis (deceased)). May 24, 1946. 612,390.

Electrolytic treatment of metals.—United Anodising, Ltd., D. MacArthur, J. V. Westwood, and D. H. Napier. May 24, 1946. 612,478.

Tank furnaces for the continuous manufacture of glass or vitreous materials.—Soc. Anon. Des Manufactures Des Glaces Et Produits Chimiques De St.-Gobain, Chauny & Cirey. May 24, 1945. 612,480.

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SITUATIONS VACANT

None of the vacancies in these columns relates to a man between the ages of 18 and 50 inclusive, or a woman between the ages of 18 and 40 inclusive, unless he or she is exempted from the provisions of the Control of Engagement Order, or the vacancy is for employment exempted from the provisions of that order.

AN expanding Middle East Oil Company urgently requires an Assistant Engineer to work initially in the London Office and be willing to accept transfer to the Persian Gulf after one year. Should possess B.Sc. Degee in Chemical or Mechanical Engineering. Will be required to assist in duties involving loading and bunkering facilities, oil gas distribution, and other oil control duties. Some experience of these duties essential. Experience in oil bunkers control with docks operating group of the Royal Engineers may be advantageous. Age 25–30. Salary starting £600-£700 per annum according to age and experience. Write, giving brief details, for application form, and quoting LO 133, to Box "P.Y." c/o J. W. VICKERS & Co., LTD., 7/8, Great Winchester Street, London, E.C.2.

ASSOCIATED Lead Manufacturers Ltd. require Metallurgical Chemists for research and development. Minimum qualifications, B.Sc. or equivalent. Salary according to qualifications and experience. Apply PERSONNEL MANAGER, Millwall Lead Works, 308, West Ferry Road, E.14.

CHEMICAL or Electrical Engineering Graduate required by major oil company for Persian Gulf, to train as Corrosion Engineer. Will train in and eventually supervise cathodic protection work on steel jetty piles and submarine pipes. Commencing salary £710 p.a., plus free messing, accommodation. Write, giving details, age, qualifications to Box "G.D.," c/o J. W. VICKERS & Co., LTD., 7/8, Great Winchester Street, E.C.2.

SITUATIONS VACANT

Applications are invited by the Ministry of Supply Division of Atomic Energy (Production), Springfields Factory, Salwick, Nr. Preston

Health Physics and Safety Assistant Manager

TO be responsible, under the Superintendent of the factory, for the work of the Health Physics and Safety Department. This Department is responsible for personnel radiation monitoring; local and environmental radiation surveys; physical, chemical and mechanical hazards; also the integration of all Factory Safety Services.

Applicants should have a Honours Degree in Physics or Chemistry or have Associateship of the Institute of Physics or Royal Institute of Chemistry, and three or more years' experience in a factory or research laboratory. Experience with electronic or radiating equipment, with safety control in physical or chemical operations or with research methods would be considered recommendations.

Salary will be assessed according to qualifications and experience within the range £720-£960 p.a.

Applicants will normally be confined to natural-born British subjects, born within the United Kingdom or in one of the self-governing Dominions, of parents also born in the United Kingdom or one of the self-governing Dominions.

Applications should be addressed to **Staff Section, Ministry of Supply, Division of Atomic Energy (Production), Risley, Nr. Warrington.**

Ri. 3426—Dec.

MINISTRY OF SUPPLY invites applications for following posts in a Research and Development Establishment in London. The work is on safety measures and other research problems connected with the Industrial use of explosives and high pressure acetylene.

SENIOR SCIENTIFIC OFFICER or SCIENTIFIC OFFICER

1. **CHEMIST.** Research experience on gaseous combustion at high pressures and detonation of solid explosives is desirable.
2. **PHYSICIST** for research on velocity of detonation of gases at high pressures and measurement of explosion pressures. A knowledge of gas kinetics and thermodynamics is desirable.
3. **CHEMIST** for analysis, stability and sensitivity tests on new explosives for industrial use. A knowledge of physics is desirable.

EXPERIMENTAL OFFICER OR

ASSISTANT EXPERIMENTAL OFFICER

4. To assist in new methods of physical testing and in the assessment and investigation of explosion and fire risks.
5. For the analysis of explosives samples taken in the field, and other analytical work in connection with explosives, samples from accidents, etc.
6. For gas analysis of mixtures of hydrocarbons and other reactants or for physico-chemical work connected with acetylene.

For posts (1) to (3) candidates must possess a good Honours degree, or equivalent, in an appropriate subject. For posts (4) to (6) the minimum qualification is Higher School or Higher National Certificate in chemistry, with experience in the field of physical chemistry.

Inclusive salary ranges are :—

Senior Scientific Officer	...	£700–£900
Scientific Officer	...	£400–£650
Experimental Officer	...	£525–£675
Assistant Experimental Officer		£230 (at age 18)–£490

Rates for women are somewhat lower.

The appointments are unestablished but those under (1) to (3) carry F.S.S.U. benefits. Opportunities to compete for established posts may occur later.

Application forms obtainable from **Technical and Scientific Register (K) York House, Kingsway, London, W.C.2,** quoting F1189/48A. Closing date 21 days from date of publication.

29.12.A.4 (50)

SITUATIONS VACANT

MINISTRY OF SUPPLY invites applications for following posts in **CHEMICAL ENGINEERING** section of a Research and Development Establishment in Essex :—

1. **CHEMIST or CHEMICAL ENGINEER** for fundamental theoretical and experimental work including work on corrosion. A good knowledge of mathematics is desirable.
2. **CHEMICAL ENGINEER** for development of chemical processes subsequent to the laboratory stage and design of plant from pilot plant to larger scale. Experience of explosives technology is desirable.
3. **PHYSICIST** for design, development, manufacture and operation of special instruments, including automatic controls, for chemical plant. Experience in instruments workshops is essential and a knowledge of electronics and of the theory of servo-mechanism is desirable.
4. **MECHANICAL ENGINEER** for experimental work on problems of stress measurement and high pressure technique and for the design of machines and plant for chemical engineering projects. Drawing Office and Workshop development experience is desirable.

Applicants should have a good Honours degree, or equivalent, in the appropriate subject.

Successful candidates will be appointed in either of the following grades, according to age, qualifications and experience.

Senior Scientific Officer Salary range : £670–£860
Scientific Officer : £380–£620

Rates for women are somewhat lower.

The appointments are unestablished but carry F.S.S.U. benefits. Opportunities to compete for established posts may occur later.

Application forms obtainable from **Technical and Scientific Register (K) York House, Kingsway, London, W.C.2,** quoting F1188/48A. Closing date 21 days from date of publication.
29.12.A.5(50)

THE Civil Service Commissioners invite applications for the following appointments in Government Departments to be filled during 1949, by competitive interview. Interviews will be held throughout 1949, beginning in January. Successful candidates may be appointed immediately.

(1) **Senior Scientific Officers.** Candidates must be at least 26 and under 31 years of age on 1st August, 1949. They must have obtained a university degree in a Scientific subject (including engineering) or in Mathematics with first or second class honours or an equivalent qualification, or possess high professional attainments, and must have had at least three years appropriate post-graduate or other approved experience.

(2) **Scientific Officers.** Candidates must be at least 21 and under 28 years of age on 1st August, 1949. They must have obtained a university degree in a Scientific subject (including engineering) or in Mathematics with first or second class honours or an equivalent qualification, or possess high professional attainments. Candidates sitting for their degrees in 1949 may be admitted to the competition before the result of their degree examination is known.

The appointments announced in (1) and (2) cover a wide range of Scientific research and development in most of the major fields of fundamental and applied science. They will be held in various Government Departments (Ministry of Supply, Admiralty, Department of Scientific and Industrial Research, Air Ministry, Ministry of Agriculture and Fisheries, Ministry of Civil Aviation, Scottish Home Department, Home Office, Ministry of Works, War Office) and the places of work are spread throughout Great Britain. Each candidate is given the fullest opportunity to express his preference in the subject of work and the Government Department and particular establishment to which he wishes to be appointed.

Inclusive London salary scales for men are :—
Senior Scientific Officer : £700 × 25–£900.
Scientific Officer : £400 × 25–£650.

Rates for women are somewhat lower.

Further particulars and application forms from the **Secretary, Scientific Branch, 27, Grosvenor Square, London, W.1,** quoting No. 2351. Completed application forms should be returned as soon as possible.
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CHEMIST/Paint. Degree standard or equivalent, to take charge and develop Laboratory Section connected with control of works paint and stoving processes. A good knowledge of modern organic finishes including plastic technology is essential. Applicants should have had good industrial experience. State age, full details qualifications and experience. Box No. 2758, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

CHEMIST required with laboratory experience of all control tests in connection with lubricating oil refining and blending at works on N.E. coast. Write giving full particulars of experience and qualifications to : WORKS MANAGER, Box No. 2756, THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

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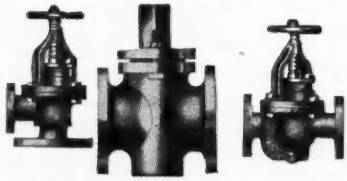
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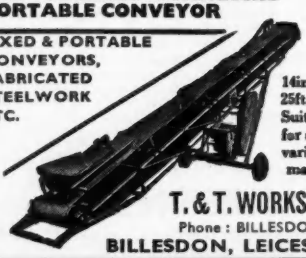
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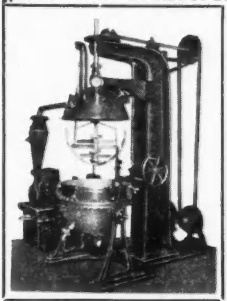

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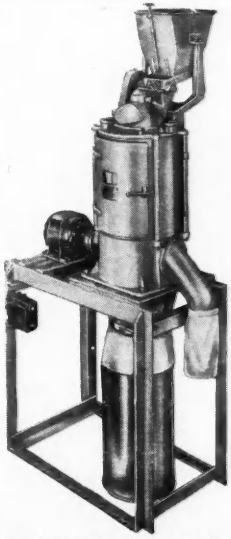

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